RAILROAD GAZETTE

FRIDAY, OCTOBER 22, 1897.

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Contributions.

The Roaring of Brick Pavements.

POUGHKEEPSIE, N. Y., Oct. 16.

TO THE EDITOR OF THE RAILROAD GAZETTE:

The letters in the *Railroad Gazette* discussing the roaring of brick pavements have interested me in view of the experience which we have had with them in Poughkeepsie.

The first pavement laid was of vitrified clay brick, upon a concrete foundation and a sand cushion, with cement grouting. It was put down late in the fall, in cold weather, and the following spring it began to roar. The first remedy tried was that spoken of in C. F. M.'s letter, as suggested by the Director of Public Works in Cleveland. Holes were bored through the pavement every few feet and liquid cement was injected, but the experiment was a failure because the space between the bricks and the foundation was so small that the cement could not be forced into it under the whole surface of the pavement. A strip of brick was then removed the length of the pavement along the curb, and an effort made to force the bricks into place by rolling. This also proved ineffectual. The pavement was then cut into large blocks the width of the street and from 10 to 12 ft. long, which were bodily raised from the foundation by a derrick. A new sand cushion was then laid and the pavement lowered into position. It still roared. Finally it was completely torn up and relaid brick by brick, cement grouting again being used, and it roars even now in spots.

A similar piece of pavement, similarly laid, in warm (but not our warmest) weather, has also roared, and has in addition cracked, risen in spots and sunk in others.

Meanwhile several miles of asphalt brick had been laid upon other streets, most of it during the summer, but some in the fall at the same time the vitrified brick was laid, upon a concrete foundation and a sand cushion, but with a sand grouting between the bricks. This pavement proved to be so successful (there being no roaring, and no unevenness of surface), that when another street was about to be paved with the vitrified brick, it was suggested that a sand grouting be used instead of the cement. This was done. Carefully screened sand, burned to remove all vegetable matter, was used, and the experiment seems in every way a success. There has been no roaring, the surface has been perfectly maintained, and it appears, after a year and a half of traffic, to wear as well as the cement grouted pavement.

Do you think a strip of wood placed next to, and along the curbing, with the ends of the brick laid against it, would take up the expansion of the brick and so prevent the arching of the pavement, and the consequent roaring?

MARSHALL HOLBROOKE.

The Lessons of two Recent Accidents.

TO THE EDITOR OF THE RAILROAD GAZETTE:

It is held by some that the expense attendant upon the installation and operation of a complete block system is prohibitive and that the railroads of the United States in general cannot afford this protection, and in consequence we now have two more serious accidents due to the fact that the railroads did not provide a block system in whole or in part to protect traffic and to guard against the misinterpretation of train orders.

I refer to the accident near New Castle, Col., where a single line of track, involving many sharp curves, is used in common by the Colorado Midland and the Denver & Rio Grande roads, and where on Sept. 10 a freight train of the one road collided with a passenger train of the other, the two meeting on a sharp curve, the result being the loss of many lives and the destruction of valuable property. The other occurred at Emporia, Kan., on Sept. 8. This, according to report, was a case where a train-order signal was passed unheeded, with the result that many more lives were sacrificed.

The railroads in the United States have cost about $60,000 per mile, and probably a considerable per cent. of this has not entered into the construction of the railroads and the equipment of same. The railroads of the kingdom of Great Britain have cost about $240,000 a mile, and yet we claim for the United States more luxurious travel than can be found in Great Britain; and this is true so long as the travel is safe. The difference in the cost of construction in the United States and England may be found in the item of safety appliances.

The railroads of Great Britain carried during the last year 800,000,000 passengers, with safety to all but five, and this was possible because the railroads, instead of expending their capital in luxurious equipment and passenger stations, chose rather to equip their lines with the most improved signaling and interlocking. The railroad companies of this country in expending large sums for handsome and convenient terminals and luxurious cars are placing monuments before the public eye which naturally lead to the belief that every appointment of such roads is on the same high plane, and it requires much less expenditure to furnish luxurious equipment to be carried over 1,000 miles of road than it does to equip 10 miles of the 1,000 so as to make it safe; and since the expenditure for safety appliances and permanent way is not seen and felt by the passenger so long as he is carried in safety, it is not, therefore, so prominent before the public gaze as is the handsome station and the palatial car.

The inventive genius of American signal engineers has enabled us to produce a system of signaling which is as effective as, and less expensive than, any system known abroad, and it is, therefore, a question of quantity instead of quality. It may be interesting in this connection to note that on one road in Great Britain, having but 2,000 miles of track, there are employed more men in the manufacture and installation of signal work than are employed by all the signal companies and in the signal departments of all the railroads of the United States, where we are now operating about 182,000 miles.

SIGNAL ENGINEER.

The Effect of Temperature on Friction.

The Westinghouse Air Brake Company,
NEW YORK, Oct. 14.

TO THE EDITOR OF THE RAILROAD GAZETTE:

The editorial comment in your issue of Oct. 8 upon the letter of the writer, published in your issue of Sept. 24, is certainly a surprise to him. While it is possibly true that the published results of the tests of the Master Car Builders' Committee upon Laboratory Tests of Brakeshoes did not fully bring out the effect of temperature upon the co-efficient friction, it appeared to the writer that the effect of temperature was sufficiently apparent in the reports of the Committee to deny challenge.

The effect of temperature upon the co-efficient of friction was sufficiently well known to the members of the Committee (to say nothing of the effects displayed in a series of tests which the Chairman of the Committee made before the writer), to show that the conclusions of the writer, stated in his letter of Sept. 18, could hardly be fairly questioned.

It was shown, in repeated tests of the same brakeshoe upon the same wheel, in the experiments of the Committee (as an acknowledged fact, confirmed by a recent report from a surviving member of the Committee), that temperature has a most remarkable effect upon the co-efficient of friction. It has long since, to the writer's personal knowledge, been shown by Mr. P. H. Dudley (by microscopical investigation of the face of brakeshoes, which the writer has also observed upon samples furnished by Mr. Dudley) that, under conditions existing in practice, the metal upon the face of the brakeshoe appears to have actually been flowing. The observations of the Brakeshoe Committee led the Committee to the inevitable conclusion that heat is an element in brakeshoe friction which must never be neglected. The Committee concluded that, inasmuch as the surface exposed is an important element regarding the co-efficient of friction, the possible deformation of the brakeshoe under heat, whereby it might expose a smaller surface for rubbing upon the wheel, would account for the decreased co-efficient of friction. Members of the Committee admit that such a continuance of experiments as would demonstrate the actual cause of the diminution of friction after continued rubbing was impossible; but, so far as the writer knows, no reliable experiments have ever been made which may properly be regarded as weakening the view that continued rubbing of the brakeshoes upon the wheels at constant speeds, or repeated experiments of the same brakeshoe upon wheels (without allowing time for cooling), demonstrate beyond question that heat is a most important element in brakeshoe friction. So far as the writer has been able to learn, there have been no authentic experiments which do not clearly show that heat is one of the most important elements in determining brakeshoe friction.

The Westinghouse-Galton experiments indicated, beyond question, that, at the same speed, the co-efficient of friction continually declined. It was shown, in the preface to the reproduced reports of the Westinghouse-Galton experiments, that this declination followed a uniform law which depends upon, and is proportionate to, the speed of rotation of the wheels. It is very easily and almost unavoidably concluded that the declination of the co-efficient of friction depends upon the heat, for the reason that the work of friction upon the brakeshoe depends upon the speed of rubbing of the wheel surface upon the shoe. It was not the purpose of the Master Car Builders' Brakeshoe Committee to enter into such great detail of experiment as would be necessary to bear upon this point; but the repeated application of the same brakeshoe to the same wheel, without allowing time for cooling, showed satisfactorily the same character of results as ought to be expected from the conclusions deduced from the Westinghouse-Galton experiments.

That we have not yet reached such conclusions as will with entire fairness, enable us to judge of the merits of different brakeshoes is hardly to be questioned; but that the experiments of the Master Car Builders' Committee have further added to the trustfulness of such information as we already have cannot reasonably be doubted. As Mr. Cloud has stated, in a recent communication, that the Master Car Builders' Committee did not undertake to carry on experiments from a scientific point of view, but rather from a practical point of view, the labors of that Committee were toward a more practical selection of brakeshoes, and it is hardly to be doubted that the Committee thoroughly fulfilled the requirements placed upon it; but it hardly appears fair, to the writer, that the published results of their experiments should be misconceived into conclusions in favor of any particular brakeshoe, without taking into consideration all the elements bearing upon the serviceability of such a shoe.

R. A. PARKE.

Handling Freight Trains Partially Equipped with Air.*

BY C. L. NICHOLS, *Superintendent Chicago, Rock Island & Pacific.*

It may be interesting to follow the course of the management of the Chicago, Rock Island & Pacific in their investigation of the subject of handling trains partially equipped with air as tending to show the foundation for the theory of those who believe in braking behind.

It was first noticed that it was considered good practice in making up freight crews to put the most experienced brakemen behind and the least experienced ahead. Next, it was known that a brake improperly applied at the rear might cause a coupling to part. It was also known that some men had a knack of applying brakes at the rear so as to govern the speed and yet avoid breaking couplings, no matter what the nature of the grades. This proved that a train *could* be held from the rear safely, if done intelligently.

When the air-brake came, the idea began to take root that the use of the hand brake was no longer necessary on trains having a few air cars. In fact this idea was advanced and is still advocated by the air-brake men. They lose sight of one of the most important factors in the handling of freight trains, namely, the possible variance of the momentum of different parts of the same train, tending towards a rupture at the weakest point.

If there were no slack in the couplings, in other words if each train were solid and moved as a complete whole, there would be no occasion for this discussion. But a freight train is composed of articulated parts, some of the joints being very loose. When one part is retarded, other parts will exert force on the retarded portion, and the result may be only a straining of the coupling apparatus, or it may be damage leading to disaster. It is my belief that a large percentage of the incidents and accidents connected with draw-gear is due to the constant unnecessary racking it gets from the enormous forces surging back and forth in trains not properly handled.

With this knowledge in mind, it became evident that only an intelligent manipulation of the slack offered a solution of the problem. It was a fact that only a small percentage of the freight cars in use were equipped with the air-brake. This rendered it certain that nearly every train would have cars of both kinds, making it likely that at times the retarding force of brakes would be applied in two places, front and rear. Observation showed that, without strict orders and constant watching, the engineman became the brakeman of the train, and the brakeman degenerated into a watchman and flagman. To the dexterity of the engineman may be attributed what success has been attained in handling long trains swiftly and with a fair degree of safety, and if the percentage of air-brake cars were large enough to give him complete control, the vocation of brakeman would be obsolete.

This much was known when our first circular of instructions was issued in 1891, which read as follows:

"Until further instructed, when freight trains are running with not more than one-half of the train equipped with working air-brakes, such trains must be held on descending grades from the rear end by the hand brakes; also when approaching stations or other stops (except emergency cases), the slack must be kept out of the train by the use of the hand brakes; that is to say, the brakes shall be set on the rear cars sufficiently to avoid the slack running up when an application of air is made by the engineman.

"Enginemen must use the greatest care in applying the air-brakes, so as to prevent unnecessary jerking of the train, breaking in two, etc.

"When the train is all, or more than half, equipped with air-brakes in working order, the engineman will control its movements with the air-brakes."

A decrease in certain kinds of accidents was noticed, but perfection had not been reached. The engineman was still charged with a large share of the work of stop-

* Abstract of a paper presented to the Central Association of Railroad Officers, August, 1897.

ping the train, while the crew were, some of the time, charged with holding out the slack. After further study and experiment it was decided that one important factor had been left out of the calculation, and that was the contingency of a train being broken in two when approaching a stop, and no one of the crew being aware of it.

Experience teaches that trains often break in two without the knowledge of trainmen. It may be due to improper methods of braking, but there are several other causes, all of which may be traced to rough handling at some time, but the fact is, trainmen cannot always know of these defects beforehand. The only course to pursue is to take account of this possibility of hidden defects and so handle each train as to nullify any such latent causes of trouble. Having reached this conclusion, a new start was made with these two propositions as a foundation:

1st. Always consider the train as broken in two when approaching a stop.

2d. Control the slack before it gets dangerous.

To apply these to actual practice a study was made of the purpose for which brakes were put on cars, resulting in a division of the subject into three parts.

1st. Stops for stations, water-tanks, etc.

2d. Holding the train on down grades.

3d. Going through sags and over hog-backs.

The first head is the simplest. Were it not for the contingency mentioned in the first proposition, that of a train broken in two approaching a stop, the stop could be left to the head brakeman and the engineman, namely, if more than half the cars were equipped with air-brakes, let the engineman stop the train; if less than half, let the brakeman set hand brakes behind the air cars sufficient to accomplish it. But this neglects our first proposition.

To guard against the danger arising from trains being in two parts approaching stations, etc., it was decided that hand brakes should be set on non-air-brake cars, beginning at the rear, sufficient to prevent the slack bunching. Then in case of a break, this would operate to stop the detached portion before it could cause damage, by running into the forward portion when the engineman began to use the air-brakes.

Under the second head, holding trains on down grades, experiment showed that the safest method was to set hand brakes on the non-air-brake cars, beginning at rear, so as to gradually stretch the train. In case the makeup of the train was such that the non-air-brake cars were insufficient to hold the whole train, air-brakes were cut out, beginning at the rear, until power enough was available under the hand brakes. Under this management of the train the slack does not become bunched, offering an opportunity for a jerk, which is the sure result of holding a train at the head end. Moreover, if a short flag should develop the engineman has the full power of the emergency to use, resulting in the brakes (hand and air) being applied immediately to so large a proportion of the train that a quick stop is possible. I have seen cases where a crew depended on eight cars equipped with air brakes to handle a train of 30 cars down a hill. How far would such a train run before it could be stopped if there came a quick call for brakes? The engineman already has most of his brake power in use, and the trainmen, having no hand brakes set to begin with, are able to set but one at a time for each man available. By the time all possible is done everything is over except the investigation. Now compare that method with the following: With the same train let there be three to five hand brakes (or as many as are necessary to control the train) set at the rear, the engineman using no air. If necessary he can add eight emergency air brakes, and it can be done instantly. In this case little or no damage results, no wrecking outfit is necessary and no tracks are blocked.

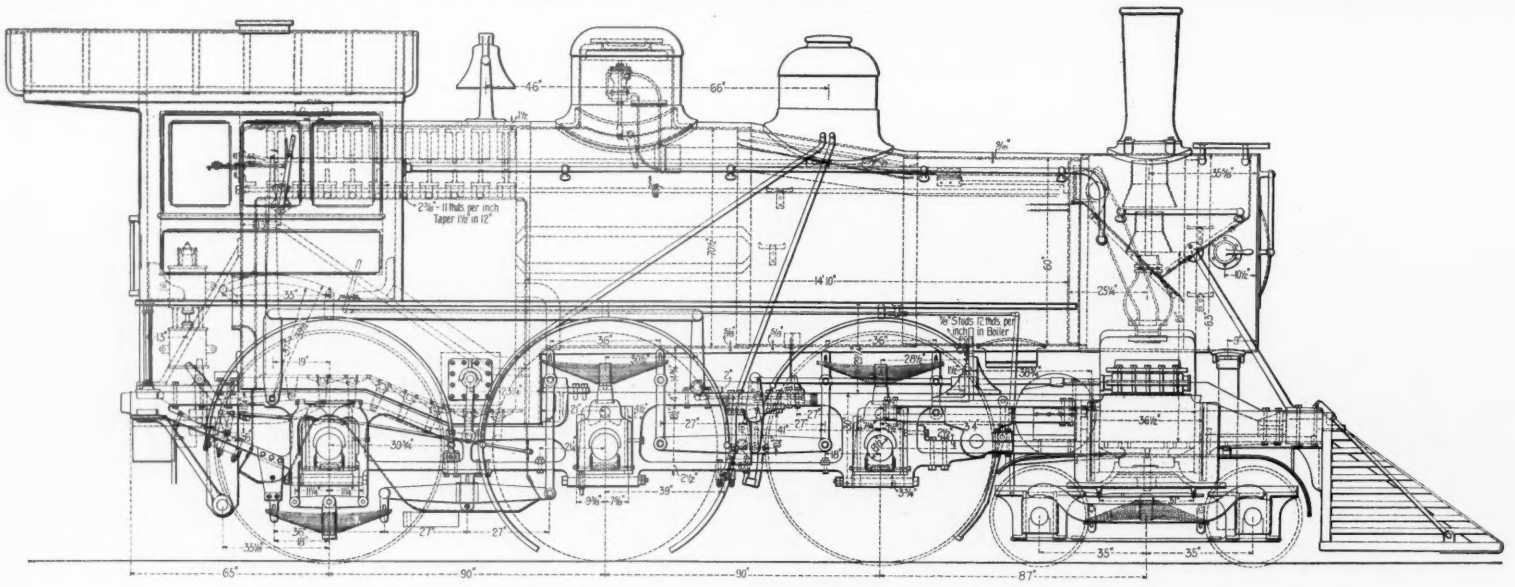


Fig. 2.—Ten-Wheel Passenger Locomotive—Atchison, Topeka & Santa Fe.

The third and most important head, because most prolific of trouble, is the handling of trains through sags and over hogbacks.

To allow a train to run down into a sag without the brakes set at the rear will result in a very perceptible bump when the engine reaches the ascending grade. We all know that it is due to the head end slowing up by reason of the grade, while the slack between the cars gives a cumulative force to the rear cars. It is not that the rear cars are moving at a greater speed than was the first car when it ran against the tender casting, but that the resistance to the forward movement increases as each car leaves the free-running portion and joins the bunched portion, so that the caboose has the greatest resistance of any to encounter, as many of us can testify.

In ascending the next grade the train may stretch out again to its fullest extent, but if the grade be too short to permit of this before another declivity is reached, the demon of slack has his favorite opportunity for cutting down dividends and growing a crop of time checks for the benefit of the train crew. For as soon as the head end pitches over the brow, and speed begins to accelerate. The more cars that go over safely, the greater the speed of the engine as compared with that of the caboose, because the slack is running out, giving each car in turn a jerk. Finally the jerk becomes so great that something gives way. The rear end perhaps has momentum enough to climb over the knoll and begins the descent as a runaway. If the mishap is discovered speedily a catastrophe may be averted. But how easily danger could have been reduced to a minimum by holding the rear end sufficiently to keep the slack in check, and therefore harmless. Let it not gain the mastery in going down into the sag, nor in going over the knoll. Go back to first principles, let the brakeman be the brakeman and the engineman be only assistant brakeman, reserving his power for its one true use—the emergency.

From these premises it was easy to obtain a few simple

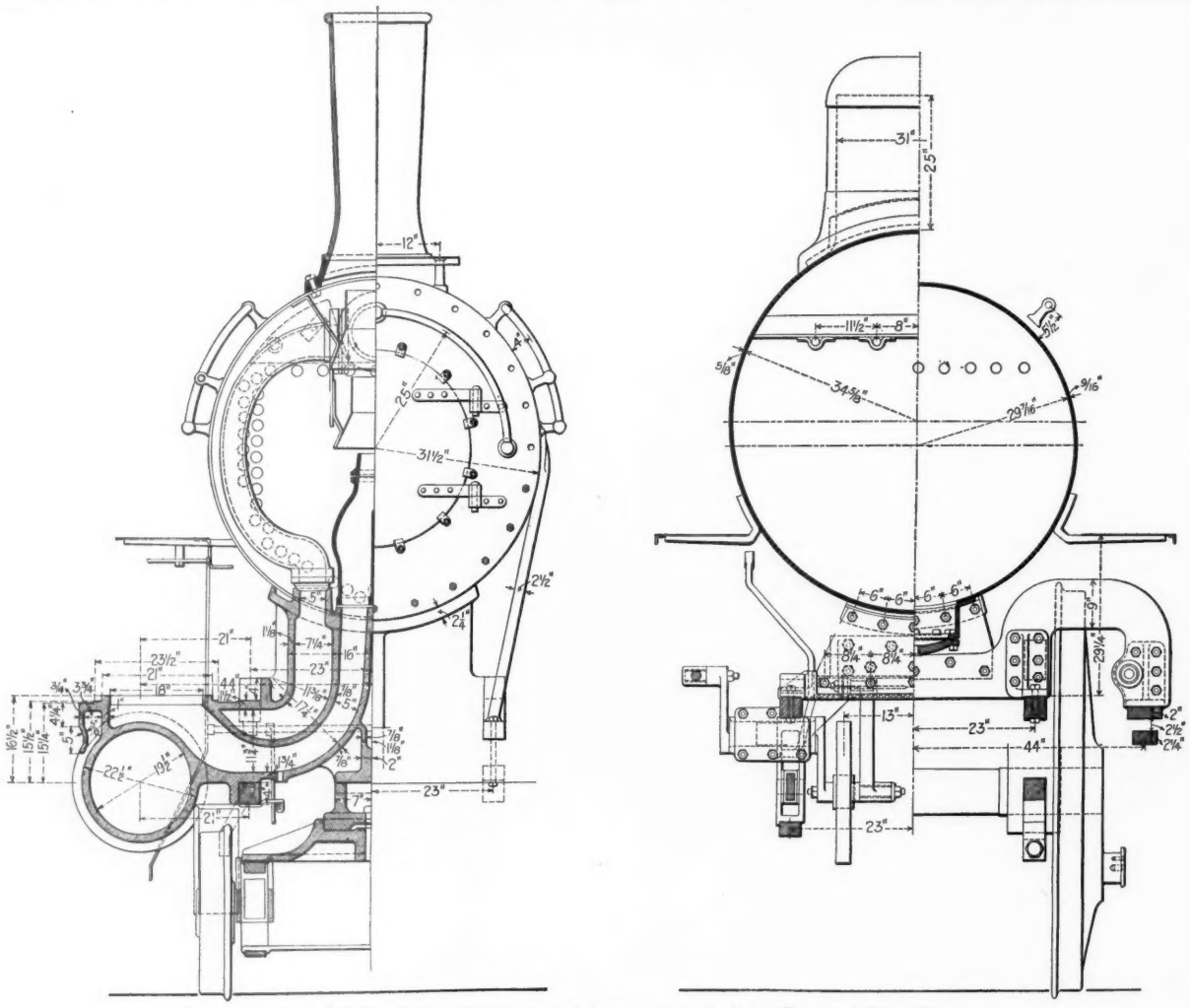


Fig. 4.—Sections Through Ten-Wheel Passenger Locomotive—Atchison, Topeka & Santa Fe.

deductions which would appear to provide for every case except the emergency. When all hands have a knowledge that a stop is to be made, apply the brakes at the rear and let the engineman govern the details with a spare use of air or of steam, as the case may require. When going down long grades let the train be held from the rear. When running over slightly hilly country let sufficient brakes be set behind to keep the train stretched, even though it requires the engine to work steam all the time. The expense of this may be considered as insurance against accident, and money well spent.

These deductions were crystallized into a rule which reads as follows:

"When there are non-air-brake cars in trains, hand brakes must *at all times* on descending grades be set on the rear cars, sufficient to prevent the slack running up or bunching. This rule also applies to trains approaching stations or other stops, and, except in emergency cases, *there must be no deviation.*

"Enginemen of trains consisting of air-brake and non-air-brake cars will, by the use of the air-brakes, *assist only in making stops*, and must whistle 'off' brakes, giving the trainmen plenty of time to release the hand-brakes before the air-brakes on the head end of train are released. They must exercise good judgment in using steam while the hand brakes are set on the rear of the train, in order to prevent the train parting.

"The engine vacuum brake must not be applied (except in emergency), unless the slack of the train is taken out either by the application of air-brakes from the engine or of hand brakes from the rear."

These deductions are the result of experiments made on the C., R. I. & P., and the methods will apply to prairie roads having a maximum grade of one per cent. I have not attempted to say what methods should be applied to a road having grades of 10 to 20 miles in length or of a mountainous road. These remarks will apply only for the conditions as stated above. It is no theory with us, but the result of long and patient experiment, under varying circumstances. Since we have enforced the ideas set forth in the above rule our troubles have almost ceased.

The spirit of this rule is contained in the two propositions taken as a foundation for our present practice, viz.:

1st. Always consider the train as broken in two when approaching a stop.

2d. Control the slack before it gets dangerous.

Ten-Wheel Passenger Locomotive—Atchison, Topeka & Santa Fe.

As has been previously noted, the Dickson Manufacturing Company, Scranton, Pa., is building eight heavy ten-wheel passenger locomotives for the Atchison, Topeka & Santa Fe., from designs made by Mr. John Player, Superintendent of Machinery for that road. Two engines on this order have now been delivered, and the others are nearly completed.

These engines will be used between Topeka, Kansas, and La Junta, Col., hauling the "California and Mexico Express" west and the "Atlantic Express" east. These trains are very heavy, usually consisting of 12 coaches, the greater part of each train being made up of sleeping and chair cars. The average schedule speed is about 30 miles an hour, but on account of the numerous stops for stations and crossings the average running speed is considerably in excess of this figure. The average grades are about one per cent., and are short, as usually found in prairie country. An important factor in train resistance on this portion of the road is that arising from the strong side and head winds, so that when all things are taken into consideration the necessity for heavy locomotives in this service is apparent.

Fig. 1 is an engraving from a photograph; Fig. 2 an elevation from a line drawing, while Figs. 3 and 4 show sections through the engine at different points.

The engine illustrated has a number of interesting details, but there are no very important features of the construction which are different from usual practice. The cylinders are 19½ in. in diameter by 28 in. stroke; the driving wheels are 73 in. in diameter; the total weight in working order is 140,000 lbs., of which 110,000 lbs. is on the drivers. The total wheel base of the engine is 25 ft. 2 in.; the driving wheel base is 15 ft. 0 in. and the total length over engine and tender is 55 ft. 0 in.

The boiler is of the extended wagon-top type, constructed of carbon steel, and carries a working steam pressure of 180 lbs. per sq. in. There are 264 charcoal iron tubes, 2 in. outside diameter and 14 ft. 10 in. long. The firebox is of carbon steel, placed above the frames. It is 7 ft. 4 in. long, 3 ft. 6 in. wide, 64⅛ in. deep at the front, and 58 in. deep at the back. The crownsheet is supported by transverse crown bars formed of tee-irons, which are supported by sling stays fastened to the roof of the wagon-top. The firebox has a brick arch on water tubes. The heating surface of the firebox is 146.5 sq. ft., that of the tubes is 2,049 5 sq. ft., making a total heating surface of 2,196 sq. ft. The grate area is 25.5 sq. ft.

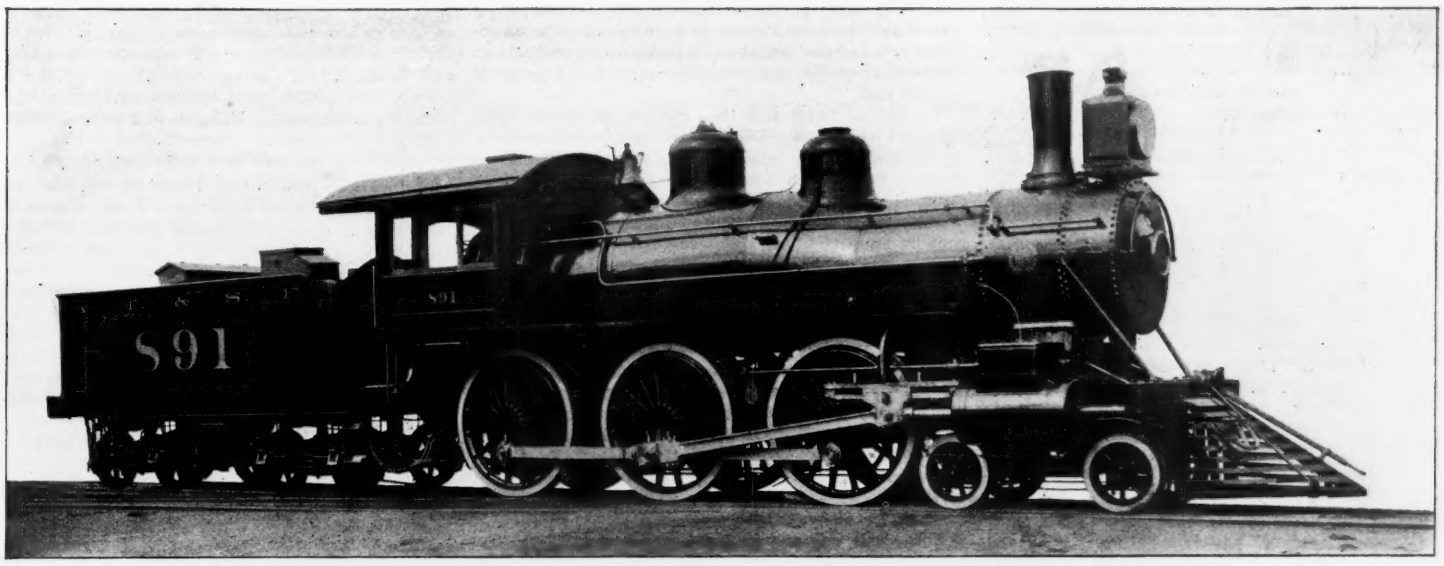


Fig. 1.—Ten-Wheel Passenger Locomotive—Atchison, Topeka & Santa Fe Railway

Designed by Mr. JOHN PLAYER, *Superintendent of Machinery.* *Built by the* DICKSON MANUFACTURING CO., *Scranton, Pa.*

The tender underframe is made of 9-in. steel shapes and the tender trucks are of the usual diamond frame type, with "Player" cast-steel bolsters. The capacity for water is 4,650 gals. and for coal, six tons.

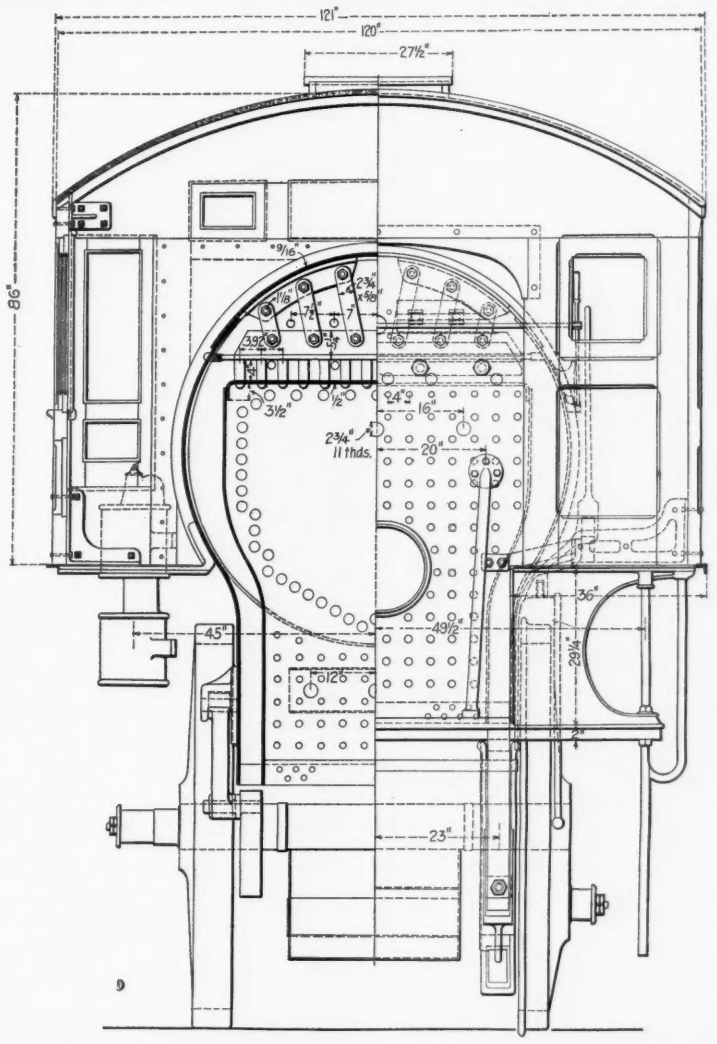


Fig. 3.—Ten-Wheel Passenger Locomotive—Atchison, Topeka & Santa Fe.

It will be noted that the firebox of the engine illustrated is very short, being but 88 in. in length. It is generally conceded that under the most favorable conditions of service with good water and fuel a poor fire in the front end of the firebox is very injurious to the firebox sheets and flues. This becomes more important on a road like the Atchison, Topeka & Santa Fe, where the water and fuel are poor, and in designing the new engines it was considered better to have a grate 88 in. long with a good uniform fire than one 108 in. long with a portion of the grate at the front end with a bad fire.

It will be noticed from the drawings that the air pump is in a new position, being placed under the fireman's seat and attached to the cab bracket; on some recent engines the air pump has been placed under the barrel of the boiler.

The spring hanger arrangement for the rear drivers is rather unusual and is a modification of previous practice where the lower ends of the hangers are curved. With the former style of spring hangers it was difficult to get a good fastening to the spring, beside being an arrangement wherein the driving box is not easily taken down. From Fig. 2 it will be seen that the spring hangers on the new locomotives are straight at the lower ends and connect by pin joints to an equalizing bar, at the center of which the spring is fastened by an ample pin connection. With this arrangement the pedestal thimble and collar can be taken down without removing the spring or any other connection.

Fig. 2 also shows the arrangement of the throttle lever. A vertical lever with a latch is placed foward in a convenient position for the engineer and is connected by a rod to the throttle lever proper. By this means the throttle is transferred from the usual location back of the boiler to a position more convenient for the engineer.

It will also be noticed that on account of the position of the rocker box a very long valve rod is necessary. To overcome the spring in this long rod it is carried through the guide yoke bracket above the guide. This bracket is a steel casting which is bushed to form a bearing for the valve rod at this point.

Cast steel is used for the following parts, instead of cast-iron, thus reducing the weight of these pieces about one-fourth: Upper brackets for boiler; suspending links; front and back boiler supports; yoke and guide brackets; main driving-wheel centers; engine truck centre plates: extending bracket under the rocker box and between the top and bottom bar of frame; dome cap and mud drum.

The engine truck wheels have wrought-iron centres and were furnished by the Standard Steel Works; the driving-wheel tires were furnished by the Midvale Steel Works. The axles are hammered iron made by the Dickson Mfg. Co. The Nathan Mfg. Co. furnished the lubricators and injectors, each engine being equipped with one No. 9 and one No. 10 Monitor injector. The Crosby

Steam Gage & Valve Co furnished the safety valves, mufflers and steam gages. The driver brake equipment is from the American Brake Co., while the tender brake equipment, air pumps and governors are Westinghouse. The National Spring Co. furnished the engine truck, tender and driving springs, and the Jerome Metallic Packing Co. the piston and valve rod packing. Houston sanding devices, Player tender brakebeams, Reed blow-off cocks and Rushford feed water heaters are used. The following are the general dimensions:

Description.

Gage	4 ft. 8½ in.
Kind of fuel to be used	Bituminous coal
Weight on drivers	110,0 0 lbs.
" " truck wheels	30,060 lbs.
" total	140,000 lbs

General Dimensions.

Wheel base, total of engine	25 ft. 2 in.
" " driving	15 ft.
Length over all, engine	37 ft. 9 in.
" " " total, engine and tender	55 ft.
Height, center of boiler above rails	8 ft. 4 in.
" of stack, " "	14 ft. 10 ir.
Heating surface, firebox	146.5 sq. ft.
" " tubes	2,049 5 sq. ft.
" " total	2,196 sq. ft.
Grate area	25.5 sq. ft.

Wheels and Journals.

Drivers, number	6
" diameter	73 in.
" material of centers—main, cast steel; front and back, cast iron.	
Truck wheels, diameter	30 in.
Journals, driving axle, size	8 in. × 10 in.
" truck " "	5 in. × 10 in.
Main crank pin, size, 6 in. × 6 in.—8¼ in. × 5 in.; back and front, 5½ in. × 3¼ in.	

Cylinders.

Cylinders, diameter	19½ in.
Piston, stroke	28 in.
" rod, diameter	3¾ in.
Kind of piston rod packing	Jerome Metallic Packing
Main rod, length center to center	10 ft. 1¾ in.
Steam ports, length	18 in.
" " width	1⅝ in.
Exhaust ports, length	18 in.
" " width	3 in.
Bridge, width	1⅝ in.

Valves.

Valves, kind of	Richardson balanced
" greatest travel	5⅛ in.
" outside lap	1 in.
" inside lap or clearance	0 in.
" lead in full gear	1/16 in.

Boiler.

Boiler, type of	Extended wagon-top
" working steam pressure	180 lbs.
" material in barrel	Carbon steel
" thickness of material in barrel	½, 9/16 and ⅝ in.
" diameter of barrel	60 in.
Seams, kind of horizontal	Quadruple butt joint
" " " circumferential	Double lap
Thickness of tube sheets	½ in. front; 9/16 in. back
" " crownsheet	½ in.
Crownsheet stayed with	Player crown bar and stays
Dome, diameter	30 in.

Firebox.

Firebox, length	7 ft. 4 in.
" width	3 ft. 6 in.
" depth front	64½ in.
" " back	58 in.
" material	Carbon steel
" thickness of sheets { sides and ends	⅝ in.
" thickness of sheets { crown	½ in.
" brick arch ?	Yes, on water tubes
" water space, width..Front, 4 in.; sides, 4 in; back, 4 in.	
Grate, kind of	Cast iron shaking

Tubes.

Tubes, number	264
" material	No. 11 "W. G." Iron
" outside diameter	2 in.
" length over sheets	14 ft. 10 in.

Smokebox.

Smokebox, diameter	63 in.
" length	61 in.

Other Parts.

Exhaust nozzle	Single
" "	Permanent
" " diameter	5½ in.
" " distance of tip below center of boiler	1 in
Netting	Wire
" size of mesh or perforation	½ in.
Stack	Taper
" least diameter	14½ in.
" greatest diameter	17¼ in.
" height above smokebox	3 ft. 10½ in.

Tender.

Type	Swivel trucks
Tank capacity for water	4,650 gals.
Coal capacity	6 tons
Kind of material in tank	Steel
Thickness of tank sheets	¼ in. and 5/16 in.
Type of under-frame	Steel, 9 in. deep
" of truck	Diamond
Truck with swinging motion.	
Type of truck spring	Double elliptic
Diameter of truck wheels	30 in.
" and length of axle journals	4¼ in. × 8 in.
Distance between centers of journals	4 ft. 6 in.
Diameter of wheel fit on axle	5⅝ in.
" center of axle	4⅝ in.
Type of truck bolster	Player cast steel
" " " transom	Channel iron
Length of tender frame over bumpers	22 ft. 3 in.
" " tank	19 ft. 9 in.
Width of tank	9 ft. 1 in.
Height of tank, not including collar	4 ft. 8 in.
" " " over collar	5 ft.
Type of back drawhead	A., T. & S. F. standard
Without water scoop.	

Track Renewal on the Olive Street Cable Road, St. Louis.

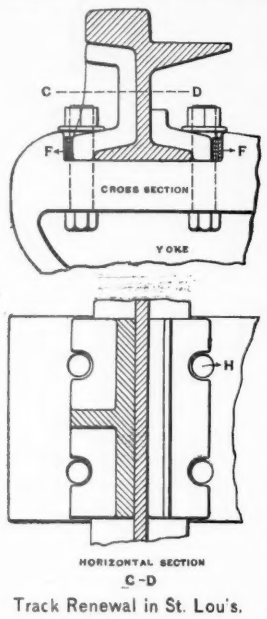
Cast-welding the rails on a cable road will doubtless seem to be an unnecessary expense, but it has just been done in connection with the track renewal of the Olive street line of the Lindell Railway in St. Louis. From what has been learned, one is disposed to believe that in this case preparations are being made for changing the motive power to electricity, and that the change will be made when the company are assured of the success of the electric conduit method. The Olive street cable road was substantially built in the summer of 1887, one year before the electric motor for street cars became an undisputed success. The road has a very heavy traffic, running cars at two-minute intervals. The line is double track, four miles long, extending from the heart of the business center of the city on Fourth street to Forest Park, a beautiful rolling tract of 1,375 acres. The cable road is very favorable for economical construction, it being nearly straight, extending almost due east and west. There are five easy bends in the line, and near its west end are two curves 80 ft. in radius each. The grades are light; the maximum only four per cent., and averaging about 2½ per cent. The space between rails of each track is paved with granite blocks for the full length of line, the balance of the street is paved with granite blocks for a distance of 2⅛ miles from the down-town end, and the remainder is covered with asphaltum, wood blocks, brick and telford in nearly equal parts of ⅝ mile each.

The old rails were 30 ft. long and weighed about 50 lbs. per yard when new. The heads of these rails have been worn down nearly one-half: few were straight when taken out, and in some places the track is out of alignment and many joints are low and most of them loose. The low joints appear even when the rail is supported on rigid cast-iron yokes encased in concrete. The rails are about worn out, though the track cannot be said to be particularly bad; it could be made to last two years more, but would require some repairs, which are always very expensive. A complete renewal is good economy when frequent repairs become necessary. It is a curious fact, though easily explained, that the "snaky" places in the track rarely occur where the whole street is paved with granite blocks. The surface of the track is also better on the streets paved with granite blocks, which seem to materially assist in keeping the track both in line and in surface.

Only the rails have been renewed; yokes, slot-rails and all other parts are in good condition, fit for further service. The relative height between the top of yoke and the top of paving determined the height of the new rails, which could therefore not exceed the old rails in depth. They are 4½ in. high, 60 ft. long and weigh 63 lbs. per yard. These were rolled by the Johnson Co., at Loraine, O.

At first thought the renewal of rails in track seems like a simple process, but it appears more complicated on closer inspection—no less than 14 different operations are necessary before the work is finished, for each of which there is a separate gang of men.

The means used for fastening the new rails to the yokes is shown in the accompanying figures. Cast-iron clips are bolted to the yoke on the inside, and cast-iron rail braces on the outside of the rail. It requires a gang of 48 men to do this part of the work, half of them being at work on the line rail about 100 ft. in advance of the other half working on the gage rail. Next to the cast-welding this is the work of the greatest importance, receiving special care and attention. The spaces *F* in the jaw of the yoke, allowing play for the rails, are filled by small pieces of heavy hoop iron, ¾ in. wide and from 1 to ⅝ in. thick, tightly driven in between the jaw and rail clip or rail brace. These pieces are usually only 2 in. in length, extending between the bolt holes in the clip or rail brace. Sometimes they are also driven in on the under side of the rail where the rust has left a furrow on top of the rail jaw of the yoke. This does not occur often; the rust on the yoke does not seem to exceed 1/16 in. in thickness at the very worst places. The small pieces of flat iron are cut by shears into lengths of 2 in., 4 in., 6 in. and 8 in. from the standard 12 ft. lengths of this iron. If other sizes or shapes are required (as frequently occurs), the men cut out the required size and shape from the pieces furnished them, using the rail as an anvil. The nuts of the bolts are screwed up by hand, then tightened as firmly as possible by hammering on the outer end of a wrench made especially for this kind of work. The nut is then set by nicking the thread of the bolt and nut with the cold chisel. There is usually more work on the gage than on the line rail, because the flange of the rail sometimes partially covers the bolt hole in the yoke, which necessitates the slow and tedious work of cutting a small piece out of the edge of the flange with the cold chisel to permit the shank of the bolt to pass up.



Track Renewal in St. Lou's.

The cast-welding of the joints is done at night in the usual well-known manner of clamping two halves of a cast iron form about the rail joint and pouring the molten iron into the form, a small portable blast furnace supplying the iron. This work is done by the American Improved Rail Joint Co., of Chicago.

A section averaging 1,000 ft. of track is finished each day of 24 hours, the successive stages of the work on each section requiring four days and two nights for entire completion.

The average number of men employed and their distribution is as follows:

1. Loosening paving blocks	8
2. Carrying paving blocks to sidewalk	22
3. Cleaning out track	32
4. Raking spalls from sand	4
5. Sledging nuts off old rails	6
6. Taking up old rails	20
7. Putting down new rails	40
8. Lining new rail and half-bolting	24
9. Full bolting	24
10. Cast-welding rail joints	16
11. Filing and smoothing cast-weld rail joints	6
12. Repaving—26 pavers, 34 helpers	60
13. Loading and removing old rails	12
14. Cleaning street	8
Total	282

The Field Columbian Museum and Railroad History.

BY HERBERT T. WALKER.

It does not appear to be widely known, even among those who take interest in the railroad history of our country, that there is at present installed in the Field Columbian Museum, Chicago, a very large collection of relics, models, photographs and drawing- of locomotives and railroad appliances, that illustrate the development of transportation and motive power from the year 1680 to the present time.

The nucleus of this representation is in the extensive collection made by the Baltimore & Ohio Railroad Company for the World's Columbian Exposition and purchased by the Field Museum.

In point of numbers and scope, the models first claim our attention. This comprehensive exhibit embraces 38 full-sized working reproductions of locomotives, made from the most careful measurements and drawings of the originals. It covers the period from the time when the first idea of steam propulsion on land was originated, to the year 1848. The exhibit begins with the design suggested by Sir Isaac Newton in the year 1680. Passing over other models, we have the "Read" of 1792; this was the first steam wagon in America, and its originator, Nathan Read, of Salem, Mass., is said to be the inventor of the first multi-tubular boiler in the world. Also further on may be noticed Trevithick's engine—the first locomotive to run on rails—of 1804; the first Baldwin engine, "Old Ironsides," 1832; the first Rogers engine, "Sandusky," 1837, and Eastwick and Harrison's "Hercules," of 1837-38, the first engine with equalizing levers.

The museum also contains no less than 15 *original* locomotives of the types followed from 1832 to 1876. The examples are arranged in the order of development and demonstrate the principles of construction with a clearness and completeness that cannot be attained by drawings, so that we have here a collection of the most valuable historical examples of locomotives in this or any other country. Standing in their original form are four of the original "Grasshoppers," and, as none were built subsequent to 1836, not one of the quartet is less than 60 years old. The first of this group, the "Atlantic," built in 1832, is the oldest American locomotive that we have in its original form. Here is also the original engine "Mississippi" of 1836, contributed by the Illinois Central Railroad Company, and the old "Pioneer" of 1848, the first locomotive in Chicago. Another valuable relic is the old engine "Rocket," No. 1 for the Philadelphia & Reading Railroad; it was built by Braithwaite of London, England, in the year 1838, and is said to be in perfect order and still fit for service.

By the courtesy of Mr. F. J. V. Skiff, Director of the museum, the writer obtained a photograph of this engine as it now stands in the East Pavilion, and a reproduction is presented herewith. It will be seen that the engine is of the Bury type, with a complicated reversing gear in front of the smokebox. The cylinders are 10½ in. diameter by 16 in. stroke. Driving wheels 4 ft. 1¾ in. diameter. Length of wheel base, 4 ft. 10 in.

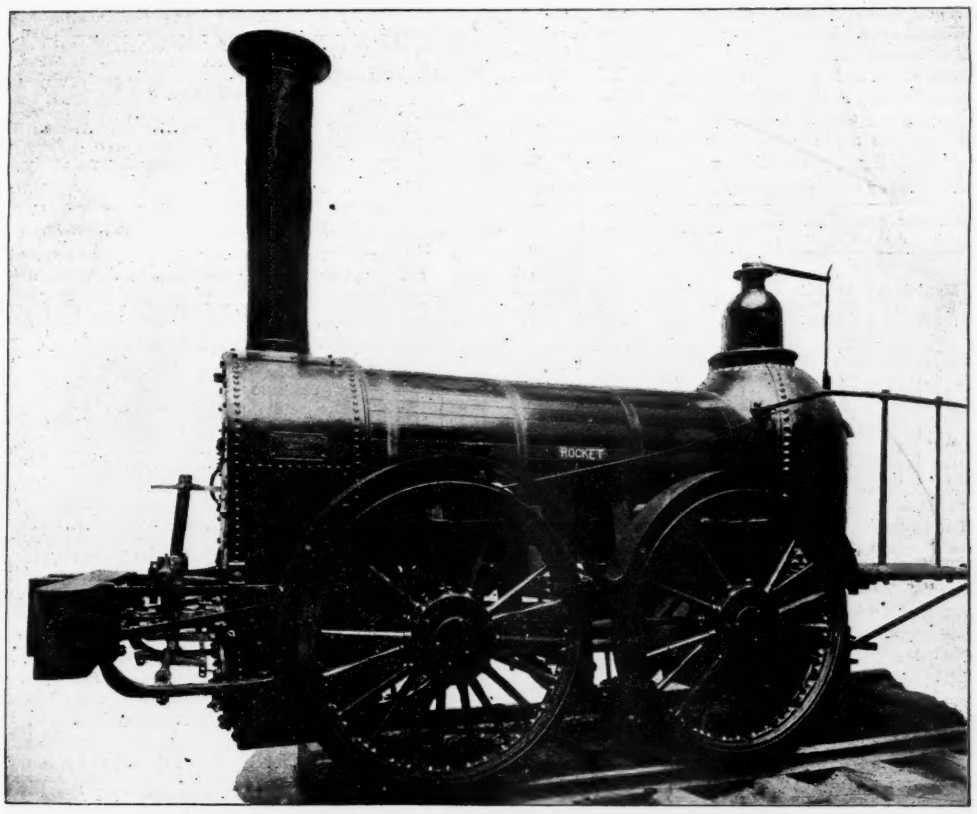
Passing over other specimens, we notice in the collection of nine original engines of the Baltimore & Ohio Railroad Co., the old "Dragon" of 1848; the "Camel" of 1852, and the "Mason" of 1853, the series being completed by the "600" of 1876, the first Mogul passenger locomotive. This formed a part of the Baltimore & Ohio Centennial exhibit in 1876. Throughout the collection in each instance, the engines, both originals and reproductions, stand upon either the original or the exact counterpart of the track of their period.

The series of drawings illustrating the development of the air-brake, the evolution and development of permanent way and the development of the American railroad bridge are of the greatest interest and value, as is also the collection made and presented to the museum by the Pennsylvania Railroad Company for the Columbian Exposition; this latter exhibit is installed in Halls 41 and 57 of the museum, and in a graphic and interesting manner brings out the progressive growth of this great railroad system.

As we cannot attempt to describe the vast array of detail drawings of historical locomotives, as well as photographs, prints and lithographs of engines, cars and railroad appliances of every kind, it will suffice to say that they, together with the objects previously noticed, go to make up a magnificent exhibition that Americans may well be proud of. Looking at the collection as a whole, it may be safely described as being far richer, more comprehensive and better arranged than that in the South Kensington Museum, London.

This brings us to another feature of the Field Museum,

which is in some ways still more remarkable. When preparations were being made for the Columbian Exposition of 1893 the Baltimore & Ohio Railroad Company despatched representatives to England with instructions to buy up all the historical data that was accessible and purchasable, and with characteristic American energy negotiations were soon opened with the oldest railroad companies and engine builders in Great Britain, who, for a reasonable consideration, allowed some of the most important and valuable drawings of early English engines to be transferred to this side of the Atlantic. Over a thousand of these drawings and tracings (some of them originals) were exhibited at Chicago, and this collection was subsequently acquired by the Field Museum. They included drawings of the engines built by the celebrated firm of Bury, Curtis & Kennedy; drawings of the engines "Blucher," of 1814, and "Invicta," of 1830, designed and built by George Stephenson; some of the rails on which Stephenson's "Rocket" ran during the famous Rainhill trials; drawings of the remarkable double-truck express engines, with 9-ft. driving wheels, for the Bristol & Exeter Railway, built by Rothwell & Co. in 1853*; also an immense collection of tracings and photographs of every class of engine which has ever run on rails in Great Britain. We have, therefore, a more complete set of drawings of historical English engines than can be found in any one place in England, so that if Englishmen wish to know the full locomotive history of their country they will have to journey to Chicago for the information.



The "Rocket," No. 1—Philadelphia & Reading. Built by Braithwaite, London, 1838

The official lists of early English engines built for American as well as for English railroads, giving the makers' numbers and the numbers of the engines as they were entered on the railroad company's books, will furnish valuable data for the future railway historian. Those who follow the English technical publications will remember the fierce discussion that raged about a year ago among engineers and would-be historians concerning the dimensions and peculiar features of certain old locomotives. This lengthened controversy was ended by the editors declining to print any more letters on the subject. Had the disputants consulted the lists above mentioned much valuable time and space would have been saved.

In conclusion it may be remarked that with such a vast storehouse of railroad relics and information in our midst, it is somewhat to our reproach that we are still without a complete history of the locomotive engine. It is to be hoped that we shall not be without one much longer.

Train Acceleration and Braking.†

BY W. B. POTTER, *Chief Engineer Railway Department, General Electric Company.*

The high rate of acceleration commonly employed in the operation of electric cars is seldom appreciated, being so constant and uniform as to occasion no discomfort to the passengers. The electric motor operating with a continuous rotary movement, and limited in effectiveness only by slipping of car wheels, is so eminently adapted to traction work as to require no special advocacy here.

The problem of acceleration and braking, considered as a principle in mathematics, is comparatively simple, but in its application to actual operating conditions it admits of endless study. The character of equipment, rolling stock, roadbed, air resistance and numerous minor details introduce variables, each of which requires consideration. I shall not attempt a general discussion in this article, but shall give a few fundamental formulæ and endeavor to show how far they are borne out by actual tests.

In the ordinary trolley or suburban service, where stops are frequent, the greater part of the power applied at the axle is used to accelerate the train, while it is coming up to speed, the remainder being utilized in overcoming train friction, so that the actual energy consumed in accelerating the train will be divided into energy of acceleration $= \frac{mv^2}{2}$ and friction losses. Treating of acceleration as applied to train service, it is more convenient to express the factors in tons and miles per hour rather than the usual terms of pounds and feet per second. For a given distance and time the tractive effort in pounds per ton for acceleration =

$$\frac{\text{Distance run in feet}}{(\text{Seconds})^2 \times .0084}$$

and to this should be added the train friction in pounds per ton, the sum giving the total tractive effort per ton. In the case of electric traction, by reference to the tractive effort curve of the motor, the current input may be closely estimated for any desired degree of acceleration. The distance or time with a given tractive effort may be easily ascertained by transposition of the above formula.

The formulæ for the braking effort while the train is coming to rest are the same as the accelerating formulæ, except that the train friction should be added to the net braking effort at the brakeshoes to make the total effective or gross braking effort. Another convenient formula for braking effort is as follows:

Gross braking effort per ton =

$$\frac{\text{Speed in miles per hour} \times 91.5}{\text{Time of stopping in seconds.}}$$

It is very instructive to note the rate of acceleration and braking in pounds per ton on some of the more important steam and electric roads operating with frequent stops and high average speeds. The data in the table were obtained during service runs, and represent an average practice for the roads mentioned.

The advantages of rapid acceleration and braking are becoming more fully appreciated, and the tendency at present is toward a higher average speed, with less time in getting up to speed and less time lost in bringing the train to rest. As a result, under these conditions roads are operated with a less expenditure of energy expressed in watt-hours per ton-mile than they would be if the accelerating rate were lower; hence to operate an elevated or rapid transit road at the best efficiency for energy, the train should be brought up to speed as quickly as possible and allowed to coast until the brakes are applied. As this efficiency is equally affected by the rate of retardation, to secure the best results the rate of braking should also be as high as practicable. In order to give a practical demonstration of the rapid train acceleration easily obtained by electric motors, a series of tests with a 10-ton single truck car and also a 25-ton double truck car were made on the experimental track at the Schenectady Works of the General Electric Company, for the information of Mr. John Lundie, of Chicago. A curve of one of such experimental runs is shown in Fig. 1. That portion of the curve showing the acceleration is made up from actual test, but as the car was not fitted with power brakes the remainder of the curve is taken at 20 lbs. per ton friction and 150 lbs. per ton for braking, in accordance with the results obtained from tests which have been made on roads in actual operation. The experimental run indicated by the heavy line shows that the car reached a speed of 41.2 miles in 20 seconds, which corresponds to an average force of acceleration of 190 lbs. per ton. To this must be added 20 lbs. per ton for train friction, making the tractive effort during acceleration average 210 lbs. per ton. The actual work done per ton weight of car up to the time of shutting off the power was 3.82 H. P. minutes output of the motors. If the force of acceleration had been only 130 lbs. per ton, as shown in the dotted line, the maximum speed would have been increased to 51 miles and the energy output of the motors to 6.05 H. P. minutes, an increase of 58 per cent. in the energy output. That is, with the same car running over the same distance in the same time, a saving of 37 per cent. in energy was effected by accelerating with a drawbar pull of 210 lbs. per ton over what would have been required with the slower rate of 130 lbs.

While for a given schedule, the total energy required will be less, as the rate of acceleration is higher, the power during the time of acceleration will be greater. This entails additional expense for motor equipment and sufficient reserve in the power station and feeder system to meet the greater fluctuations of current. These various details make the study of rapid transit problems a subject of great importance and the design of motors for such service a matter of careful calculation.

Referring again to the curve (Fig. 1), the average current input to the motors during the acceleration was 27.3 amperes per ton weight of car, giving an input of 6.06 H. P. minutes. Hence the efficiency during acceleration, that is, the ratio of useful work expended in moving the train (3.82 H. P. minutes), to the energy input was 63 per cent., the total loss in the rheostats, controller, gearing and motors being 37 per cent. of the input. This efficiency is based on a constant potential at the motors, and, therefore, does not include line losses. It is a fair sample of what may be expected in this class of work. This efficiency is based upon series parallel control, with two motors in series at starting, and connecting them in parallel combination immediately after the resistance is cut out from the series combination. After the controller has been turned to full speed position, the losses are only those in the motor itself, which amount then to only 15 per cent. or 20 per cent. Assuming the efficiency during acceleration to be an average of 65 per cent., the energy required to move a train in a service consisting wholly of acceleration at a given schedule speed and for different distances may easily be calculated, and the proper size of the motors determined for the work to be done. Other conditions being unchanged, the energy input is directly proportional to the weight of the train. With double the weight of train motors of twice the power are required. With different schedule speeds for the same voltage, weight of train and distance between stations, the minimum difference in power and energy will vary at least as the cube of the speeds, and may be considerably in excess of this difference.

Increasing the schedule speed 25 per cent. would, therefore, call for motors of about double the capacity. With a given motor the C^2R losses would vary approximately as the sixth power of the difference in schedule, an increase of 25 per cent. in schedule causing nearly four times the heating effect. While the above holds

A TABLE OF COMPARATIVE RETARDATION—POTTER.

Railroad.	Remarks.	No. of Cars.	Weight of train in net tons.	Grade.	Type of brake.	Speed in miles per hour on application of brakes	Distance stopping in feet.	Time stopping in seconds.	Average rate of retardation per second in miles per hour.	Equivalent braking effort in lbs. per net ton.
Metropolitan Elevated	Service.	2	44	L	Straight air.	19	181	13	1.46	133
Lake Street Elevated	Service.	2	44	L	Autom. air.	2[illegible]	293	16	1.56	142
Alley Elevated	Service.	3	72	L	Autom. air.	31	522	23	1.35	125
Illinois Central	Service.	4	116	L	Autom. air.	40	1,086	37	1.08	98
Manhattan Elevated	Service.	4	95	L	Vacuum.	22	387	24	0.92	84
Cleveland, Painesville & Eastern.	Service.	1	20	L	Electric.	40	585	20	2.0	183
Cleveland, Painesville & Eastern.	Emergency ..	1	20	L	Electric.	30	220	10	3.0	275
Lorain & Cleveland	Emergency ..	1	23	L	Electric.	45	461	14	3.21	295
Schenectady Street Ry.	Service.	1	9	L	Electric.	23	135	8	2.88	264

* Illustrated in the *Railroad Gazette*, March 23, 1894.
† A paper in the *Street Railway Journal* for October.

true for acceleration only, and although the heating of the motors would be modified by the amount of free running, these facts have an important bearing upon the practical limitations of a motor. Where trains are running at constant speed the energy varies directly as the weight and also as the speed, excepting air resistance. Under these latter conditions the heating effect upon a given motor would vary only as the square of the speed.

The requirements for different kinds of service depend largely, therefore, upon the relative amount of acceleration and free running.

The curve (Fig. 2) based on the test shown in Fig. 1 has been prepared to illustrate the relation between the rate of acceleration and the work to be done, all values being given in pounds per ton and watt-hours per ton-mile. The increased energy required with a decreasing rate of acceleration is clearly indicated. The train friction is assumed to be 20 lbs. per ton constant at all speeds, an average fairly high enough to include the total friction losses; and the tractive effort as given in the curve includes this 20 lbs. per ton train friction. The watt-hours per ton-mile are based upon an assumption of 65 per cent. efficiency during acceleration, as before mentioned. It will be seen from this curve (Fig. 2) that at 210 lbs. tractive effort the watt-hours per ton-mile are 104, while at 130 lbs. the watt-hours are increased to 164, an increase in energy of 58 per cent. With the lower tractive effort the maximum speed is higher and the time of coasting reduced with a consequent greater loss of energy in braking.

The advantage of rapid acceleration is well shown by the curves (Fig. 3), both representing the same distances between stations. The rapid acceleration is from the General Electric tests before mentioned, while the other curve is taken from actual service of a steam elevated system. Assuming the stops to occupy 10 seconds each, the schedule with the more rapid acceleration is 20.4 miles per hour; in the other case 12.8 miles per hour only. This means a saving of 16.8 minutes for a run of 10 miles. With a given headway between trains and the more rapid acceleration only 60 per cent. of the number of trains would be required to give the equivalent traffic capacity of the lower acceleration.

As a matter of comparison, assuming the use of electricity for the above mentioned steam service, the actual energy expended per train is about 2.5 times greater with the higher acceleration, but as 60 per cent. of the number of trains would suffice, the total energy required is increased about 50 per cent. only. The power required during acceleration, however, is about five and a half times greater with the faster acceleration, requiring motors of high current capacity and excellent commutation.

Electric motors for work of this character have been developed, and have rendered feasible a service impossible with steam locomotives. The advantages of electric traction are compelling appreciation, as the demand for rapid transit increases in urgency.

A Long Locomotive Run.

Another remarkable locomotive performance is the long run made between Evanston, Wyo., and Omaha, Neb., on the Union Pacific, Aug. 3 and 4 last, which attracted considerable attention at the time. Through Mr. J. H. McConnell, Superintendent of Motive Power of the road, we are able to give now the official figures for the run.

Through the entire distance of 955.2 miles but one engine was used and neither the engine crew nor train crew was changed. The train was a special carrying officers of the road, and the run from Evanston to North Platte was made on about the same schedule as the regular "Overland Limited" train, No. 2; it was the intention when starting from Evanston to run on this schedule through to Omaha, but before reaching North Platte one of the party received a message that his presence was required in Chicago on the following morning. It was then decided to overtake the train which leaves Omaha for Chicago at 4:45 p. m., and, as the schedule will show, this was accomplished. It will, therefore, be seen that there were no special preparations made for the run and that the fast time was made after leaving North Platte.

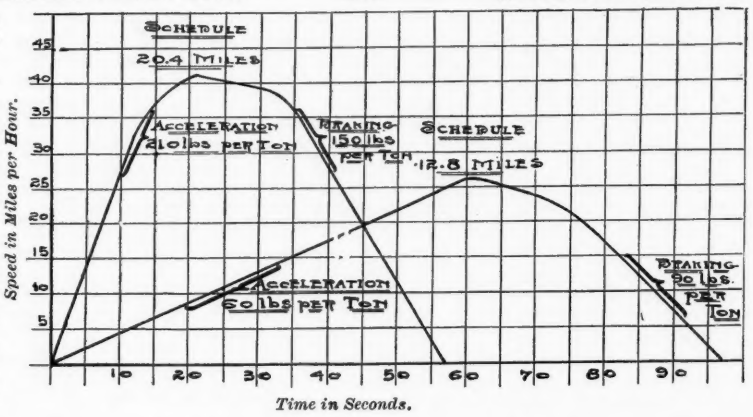


Fig. 3.—Acceleration Curves—Distance, 2,000 ft.; Train Friction, 20 lbs. per Ton.

The train was made up of one baggage and two special cars, the weight of the three cars being 264,775 lbs. The weight of the engine and tender in working order was 226,833 lbs., making the total weight of the train 491,608 lbs.

The engine used is of the eight-wheel type and the principal general dimensions are given in the following table:

DIMENSIONS OF EIGHT-WHEEL ENGINE NO. 890.

Cylinders.

19 in. dia. by 24 in. stroke.	
Steam ports	17 × 1¼ in.
Exhaust ports	17 × 3 in.
Out to out of frames	4 ft. 2¼ in.
Total length of engine and tender	63 ft. 8 in.

Boiler.

Outside dia. of smallest ring	60 in.
Thickness of shell in barrel	5/16 in.
253 tubes	2 in. dia., No. 11 B. W. G., 11 ft. 6½ in. long
Firebox, inside	96 in. long × 34¼ in. wide
"	65 5/16 in. high at front, 61 in. at back
Grate surface	22.8 sq. ft.
Heating surface in tubes	1,517.9 sq. ft.
" " firebox	171 sq. ft.
Total heating surface in boiler	1,688.9 sq. ft.

Weight of Engine.

Weight of engine, 2 gages of water	119,600 lbs.
" on drivers, 2 gages of water	81,025 lbs.
" of tender, empty	45,900 lbs.
Capacity of tank in gallons	4,000 gals.
Pounds of coal (lump)	28,000 lbs.
Total weight of engine and tender in working order	226,833 lbs.

The start was made from Evanston at 3:50 p. m., August 3, arriving at Cheyenne, the end of the Wyoming Division, at 3:55 the following morning; the distance is 438.9 miles, which would make an average schedule speed of 36.32 miles an hour and an average running speed of 45.51 miles an hour. The Nebraska Division from Cheyenne to Omaha is 516.3 miles long and the latter point was reached at 4:45 p. m., Central time, Aug. 4, making an average schedule speed of 45.9 miles an hour or an average running speed of 55.51 miles an hour over this division. The whole distance of 955.2 miles was run in 23 hours 55 min., at an average speed of 39.93 miles an hour, and when time lost is deducted, the running time becomes 20 hours 8 minutes, and the average running speed 47.44 miles per hour.

In the following schedule are given the names of stations, distances between, the time at stations and the reasons for delays and stops. For that portion between North Platte and Omaha, the run is given more in detail and the speeds are calculated at a number of points. It will be seen that the highest

A Table of Comparative Accelerations.—Potter.

Railroad.	Remarks.	No. of cars.	Weight of train in net tons.	Grade.	Tractive effort per net ton. Maximum for given time.		Average for total time.		10 seconds. Average rate of acceleration.	Speed miles per hour.	Distance run, feet.	20 seconds. Average rate of acceleration.	Speed miles per hour.	Distance run, feet.	30 seconds. Average rate of acceleration.	Speed miles per hour.	Distance run, feet.	40 seconds. Average rate of acceleration.	Speed miles per hour.	Distance run, feet.
					Sec.	Lbs.	Sec.	Lbs.												
Metropolitan Elevt'd	Elect. (15 lbs. per ton friction).	2	44	L	10	158	40	91	1.64	16.4	120	1.12	22.5	330	1	30	660	.87	34.8	1,020
Lake street Elevated	Elect. (15 lbs. per ton friction).	2	44	L	10	121	40	75.2	1.22	12.2	90	1.02	20.5	300	.773	23.2	510	.69	27.6	870
Alley Elevated	Steam (15 lbs. per ton friction).	3	72	L	10	121	40	87.4	1.22	12.2	90	.975	19.5	285	.80	24	540	.715	28.6	840
Illinois Central	Steam (15 lbs. per ton friction).	4	116	L	10	86	40	71	.817	8.17	60	.715	14 3	210	.682	20 5	450	.64	25.6	750
Manhattan Elevated.	Steam (15 lbs. per ton friction).	4	95	L	10	80	40	60	.75	7.5	548	.675	13.5	198	.58	17.5	386	.52	21	615
Spec. Test Gen. El. Co.	Elect. (20 lbs. per ton friction).	1	25	L	10	282	20	186	3.0	30	220	1.9	38	556						
" " "	Elect. (20 lbs. per ton friction).	1	9	L	10	264	20	199	2.8	28	206	2.05	41	600						
" " "	Elect. (20 lbs. per ton friction).	1	9	L	10	163	20	126	1.64	16.4	120	1.22	24.5	360						

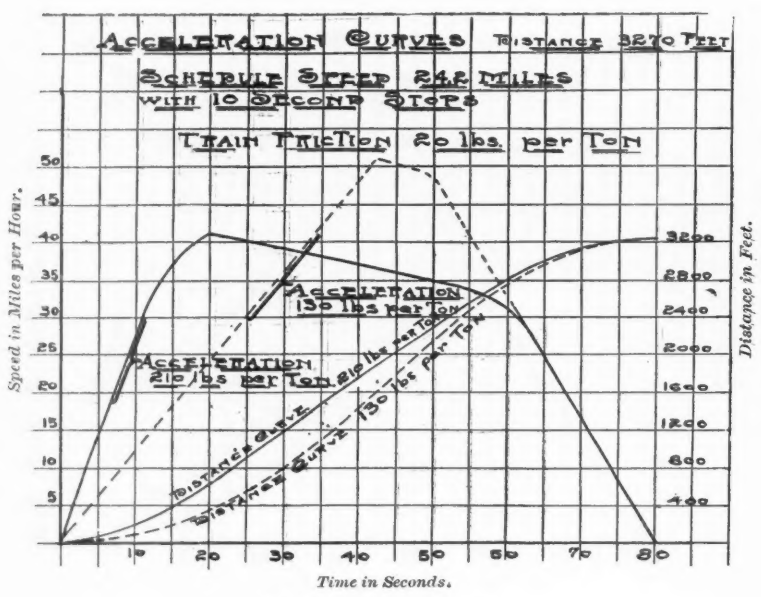


Fig. 1.—Acceleration Curves.

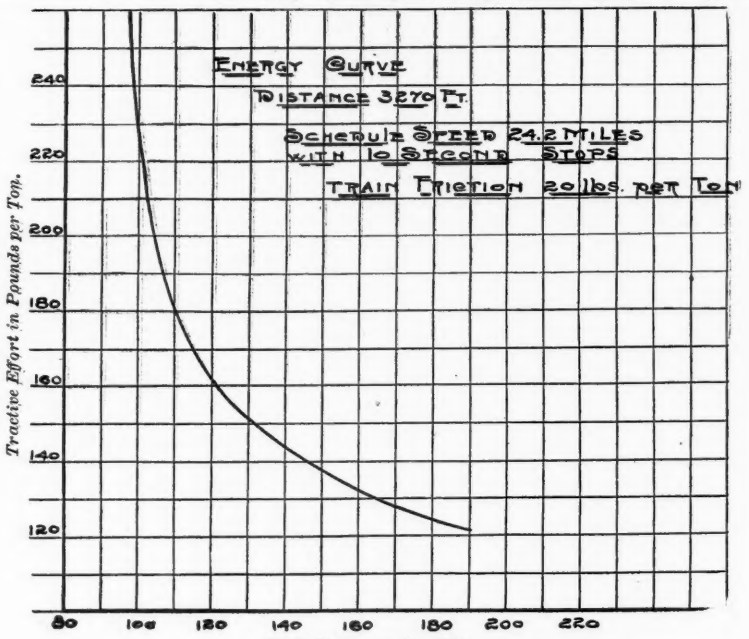

ENERGY CURVE
DISTANCE 3270 FT.
SCHEDULE SPEED 24.2 MILES
WITH 10 SECOND STOPS
TRAIN FRICTION 20 lbs. PER TON
Tractive Effort in Pounds per Ton.
Watt-Hours per Ton-Mile.

Fig. 2.—Energy Curve.

Travel of valve	5¾ in.
Lap of valve, outside	⅞ in.
Lead, in full gear	1/16 in.
Throw of eccentric	5¾ in.
Distance cen. to cen. of cyl'ds	6 ft. 5 in.
Exhaust nozzles	Double

Wheels.

Dia. of driving wheels	69 in.
" " " centers	62 in.
" " truck wheels	30 in.

Journals.

Driving axle journals	8 dia. × 11¼ in.
Truck axle journals	5½ dia. × 10 in.
Main rod journal	5 dia. × 5 in.
Side rod, main driver	4 dia. × 4 in.
" " trailing "	4 dia. × 4 in.

RECORD OF RUN OF GENERAL MANAGER'S SPECIAL, UNION PACIFIC RAILWAY, AUG. 3 AND 4, 1897. EVANSTON, WYO., TO OMAHA, NEB., 955.2 MILES.

Elapsed Time, 23 hr. 55 min. = 39.93 miles per hour.
Running Time, 20 hr. 8 min. = 47.44 miles per hour.

WYOMING DIVISION.

EVANSTON TO CHEYENNE, 488.9 MILES.

Elapsed Time, 12 hr. 5 min. = 36.32 miles per hour.
Running Time, 10 hr. 50 min. = 45.51 miles per hour.

Name of station.	Distance between stations.	Time at station.	Stops and delays.
		Mountain time.	
Evanston	0	3:50 p.m.	
Hilliard	13.2	4:09 "	
Aspen	4.5	4:15 "	
Piedmont	9.2	4:29 "	
Carter	24.4	4:58 "	
Granger Ar'.	28.5	5:33 "	Water, 5 min.
" L'v.		5:38 "	
Bryan	17.0	6:01 "	
Green River Ar'.	13.5	6:25 "	Registering and oiling, 5 min.
" L'v.		6:30 "	
Point of Rocks Ar'.	40.1	7:26 "	Water, 5 min.
" L'v.		7:31 "	
Bitter Creek	20.3	7:55 "	
Tipton	17.1	8:17 "	
Wamsutter Ar'.	15.7	8:35 "	Coal and water, 10 min.
" L'v.		8:45 "	
Creston	14.9	9:10 "	
Solon	20.8	9:36 "	
Rawlins Ar'.	6.7	9:47 "	Orders, 3 min.
" L'v.		9:50 "	
Ft. Steele Ar'.	15.3	10:15 "	Water, 4 min.
" L'v.		10:19 "	
Simpson	31.7	11:01 "	
Carbon	6.3	11:12 "	
Medicine Bow Ar'.	10.9	11:30 "	Coal, 7 min.
" L'v.		11:37 "	
Rock Creek	22.6	12:18 a.m.	
Look Out Ar'.	17.0	12:47 "	Water, 2 min.
" L'v.		12:49 "	
Huttons Ar'.	12.6	1:16 "	Meeting No. 1, 10 min.
" L'v.		1:20 "	
Wyoming Ar'.	6.4	1:29 "	Water, 2 min.
" L'v		1:31 "	
Laramie Ar'.	13.7	1:55 "	Terminal stop, orders, oiling, 15 min.
" L'v.		2:10 "	
Red Buttes	9.2	2:20 "	
Dale Creek Ar'.	10.8	2:41 "	Water, 5 min
" L'v		2:46 "	
Sherman Ar'.	3.8	2:54 "	Registering, 2 min.
" L'v.		2:56 "	
Granite Canon	13.6	3:22 "	
Cheyenne	19.1	3:55 "	

NEBRASKA DIVISION.

CHEYENNE TO OMAHA, 516.3 MILES.

Elapsed Time, 11 hr. 15 min. = 45.9 miles per h'r.
Running Time, 9 hr. 18 min. = 55.51 miles per h'r.

Name of station.	Distance between stations.	Time at station.	Stops and delays.
		Mountain time.	
Cheyenne	0	4:30 a.m.	
Hillsdale	20	4:56 "	
Egbert Ar'.	12.1	5:12 "	Orders held for No. 3, 4 min.
" L'v.		5:16 "	
Pine Bluffs Ar'.	11.1	5:30 "	Meeting 2d section of No. 3, 15 min.
" L'v.		5:45 "	
Kimball	21.9	6:10 "	
Potter	18.2	6:32 "	
Sidney Ar'.	18.9	6:55 "	Terminal stop, orders, and work on engine, 15 min.
" L'v.		7:10 "	
Lodge Pole	17.7	7:37 "	
Chappell	9.5	7:44 "	
Julesburg Ar'.	15.0	8:00 "	Orders, coal and water, 13 min.
" L'v.		8:13 "	
Ogallala	30.4	8 45 "	
Paxton Ar'.	19.3	9:12 "	Water, 5 min.
" L'v.		9:17 "	
Sutherland	12 2*a*	9:30 "	
Hershey	6.1*b*	9:35 "	
North Platte Ar'.	13.0*c*	9:45 "	Terminal stop, 23 min.
		Central time.	
" L'v.		11:08 a.m	
Maxwell	13.5*d*	11:22 "	
Brady Island	9.2*e*	11:30 "	
Gothenburg	12.9*f*	11:41 "	
Cozad Ar'.	10.3	11:53 "	Delay for 1st & 2d sections of No. 19, 5 min.
" L'v.		11:58 "	
Lexington Ar'.	14.0*g*	12:11 p.m.	Coal and water, 6 min.
" L'v.		12:17 "	
Overton	11.0*h*	12:29 "	
Elm Creek	8.7*i*	12:36 "	
Kearney Ar'.	15.6*j*	12:50 "	Registered, 2 min.
" L'v.		12:52 "	
Buda	4.6	1:00 "	
Gibbon	8 4*k*	1:08 "	
Shelton	6.1*l*	1:14 "	
Wood River Ar'.	7.5*m*	1:20 "	Meeting No. 1 and taking water, 4 min.
" L'v.		1:24 "	
Alda	7.8	1:32 "	
Grand Island Ar'.	7.9	1:40 "	Terminal stop, orders, 10 min.
" L'v.		1:50 "	
Chapmans	11 6	2:08 "	
Central City	10.1	2:19 "	Lost 6 min. slowing up four times for gravel outfit.
Clarks	11.3*n*	2:29 "	
Silver Creek	11.3*o*	2:40 "	
Columbus Ar'.	17.8*p*	2:55 "	Water, 5 min.
" L'v		3:00 "	
Schuyler Ar'.	15.8	3:20 "	Stop.
" L'v.		3:29 "	
Rogers	7.3	3:29 "	
North Bend	7.1*q*	3:35 "	
Ames	8.0	3:44 "	
Fremont Ar'.	6.9*r*	3:50 "	Stop.
" L'v.		3:50 "	
Valley	11.4	4:06 "	
Elkhorn	6.2*s*	4:11 "	
Millard	8.3*t*	4:18 "	
Papillion	5.6*u*	4:23 "	
Gilmore	4.9	4:30 "	Slow run account delay, loss 4 min.
Omaha	9.8	4:45 "	

a, 12.2 m. in 13 min. = 56.3 m. per hr.; *b*, 6.1 m. in 5 min. = 73.2 m. per hr.; *c*, 13 m. in 10 min. = 78 m. per hr.: 31.3 m. in 28 min. = 67.07 m. per hr.
d, 13.5 m. in 14 min. = 57.85 m. per hr.
e, 9.2 m. in 8 min. = 69 m. per hr.: *f*, 12.9 m. in 11 min. = 70.36 m. per hr.: 22.1 m. in 19 min. = 69.79 m. per hr.
g, 14 m. in 13 min. = 64.6 m. per hr.
h, 11 m. in 12 min. = 55 m. per hr.
i, 8.7 m. in 7 min. = 74.57 m. per hr.: *j*, 15.6 m. in 14 min. = 66.85 m. per hr.: 24.3 m. in 21 min. = 69.43 m. per hr.
k, 8 4 m. in 8 min. = 63 m. per hr.; *l*, 6.1 m. in 6 min. = 61 m. per hr.; *m*, 7.5 m. in 6 min. = 75 m. per hr.: 22 m. in 20 min. = 66 m. per hr.
n, 11.3 m. in 10 min. = 67.8 m. per hr.; *o*, 11.3 m. in 11 min. = 61.63 m. per hr.; *p*, 17.8 m. in 15 min. = 71.2 m. per hr.: 40.4 m. in 36 min. = 67.33 m. per hr.
q, 7.1 m. in 6 min. = 71 m. per hr.
r, 6.9 m. in 6 min. = 69 m. per hr.
s, 6.2 m. in 5 min. = 74.4 m. per hr.; *t*, 8.3 m. in 7 min. = 71.1 m. per hr.; *u*, 5.6 m. in 5 min. = 67.2 m. per hr.: 20.1 m. in 17 min. = 70.94 m. per hr.

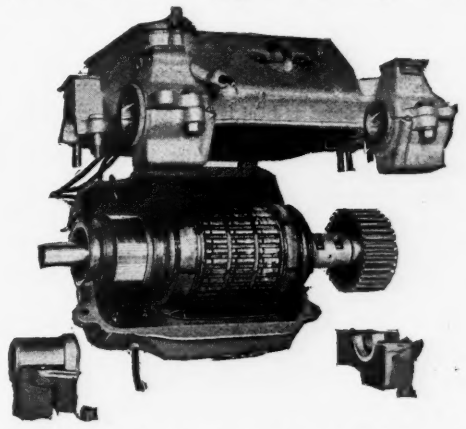
speed attained was 78 miles an hour, which was held for a distance of 13 miles. The average running speed from North Platte to Grand Island, 137.5 miles, was 61.1 miles an hour and from Grand Island to Omaha, 153.4 miles, it was 57.52 miles per hour, while for this whole distance the average running speed was 59.17 miles an per hour.

As was previously mentioned, no changes were made in the engine and train crews throughout the entire run, Mr. Thomas Grogan being the engineer, Mr. Thomas Griffin the fireman and Mr. George Baird the conductor.

New General Electric Motor for Heavy Service.

In line with the G. E. 52 and G. E. 1,000 railroad motors* the General Electric Company announces a third, the G. E 57, illustrated by the accompanying engraving. It is intended for heavy city and suburban work and is suitable for such service where either two or four motors for a car are required.

The G. E. 57 has an output of 50 H. P. at 500 volts, rated according to standard General Electric basis, that is, a maximum rise of 75 deg. C. in the temperature of

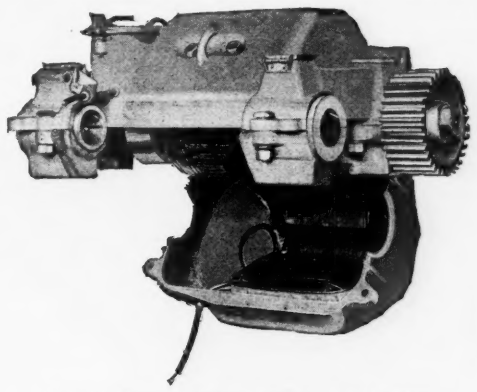


G. E. 57 Motor, Showing Armature Ready for Removal.

the windings after a run of one hour at rated load, the temperature of the surrounding air not exceeding 25 deg. C.

The frame is of similar construction to that of the G. E. 52 motor. It is steel, cast in two bowl-shaped pieces with a hand-hole in the lower half, directly beneath the commutator. This permits free access to the bottom of the motor for inspection or cleaning. The frame is both water and dust proof, the cover plate of the top being provided with a felt gasket and clamping bolts as in the G. E. 1,000 motor. The motor has four laminated poles, each having a separate coil held in place by the pole piece, which is bolted to the frame, the bolts projecting through the frame with nut and lock washer on the outside.

Considerable trouble has been experienced from too small motor bearings and their poor lubrication, and this motor has been designed with extra large bearing surfaces. The armature bearings are of the following dimensions: Pinion end, 3¼ × 8¾ in.; commutator end, 2⅛ × 6⅝ in. They are designed and built on the "outboard" plan. The support for the upper half of the lining is cast as a part of the upper half of the frame and between the inner end of the outboard bear-



G. E. 57 Motor, Showing Armature in Position.

ing and the motor frame there is a large cored recess. This space is utilized for a combination thrust collar and oil guard, which is funnel shaped and extends through the motor frame into the cored recess where it acts as an oil guard. A cap supports the lower half of the lining, and is bolted to the upper half, but not enclosing the lower half of the oil guard. This permits free egress to the lubricant after it has passed through the bearing and also makes it impossible for the grease or oil to work through into the motor frame. The lower boxes, or oil wells, are provided with felt wicks, which wipe the shaft through holes cut in the linings. For the armature bearings there are two of these wicks on the pinion end and one on the commutator end. For each of the axle bearings there are two wicks.

The coils are wound on thoroughly insulated cast-iron spools. A covering of heavy duck drawn together and sewed after the spool has been wound forms a perfect mechanical protection for the winding. As in the G. E.-1,000 motor, the upper and lower field connection is made on the outside of the motor, and all leads to the car are brought out on the front end. This has been found convenient in the car wiring and opening of the motors.

The armature is 14 in. in diameter and has 33 slots. There are 33 triple coils; each coil is composed of three separate coils bound into a compact single unit. The armature is iron-clad, and the core is made up of annealed, laminated disks placed directly on the armature shaft. In building up this core three sets of spacing blocks are used, providing three ventilating ducts.

The separate coils are wound with either two or three turns for each coil, as may be specified, the three-turn winding being standard for ordinary service. This method of winding offers advantages in the matter of armature repairs. There are comparatively few coils to look ofter, while the construction admits of a substantial and very perfect insulation. Special attention has been given in the design of this motor to making the armature as light as possible without impairing its strength and efficiency. A light armature having small inertia presents some advantages in accelerating and retarding a car.

The standard gear ratio is 1 to 3.72, with a taper bore pinion having 18 teeth, and a cast-steel gear having 67 teeth, and a face of 5 in. A two motor equipment with this ratio will drive an 18-ton car about 26 miles an hour on a level track. For heavier work a lower speed gear ratio may be used, giving a slower speed and correspondingly increased tractive effort. A higher gear speed gear ratio may also be used, giving an increased speed and correspondingly decreased tractive effort.

The commutator has 99 segments. These are made of hard drawn copper 2 in. deep, allowing a wearing depth of 1 in.

The standard G. E. 57 motor is adapted to either the nose or the yoke suspension as with the G. E. 1,000 or the G. E. 52 motor. The motor can be fitted for side bar suspension, but the yoke suspension is recommended, for then the weight of the motor is carried on springs placed on the side frames of the car trucks. Lugs are cast on the upper half of the motor frame, to which the suspension bar is bolted. For inspection or repairs the lower half of the motor can be swung down into the pit without disturbing the upper half. When the motor is mounted

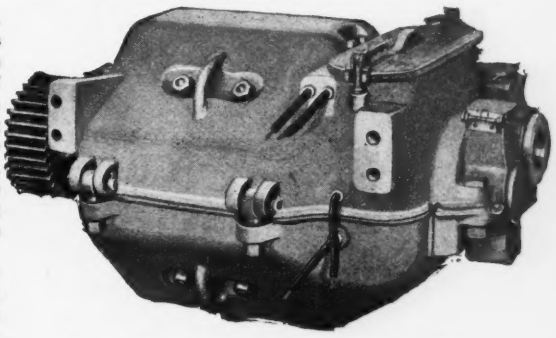


Fig. 1.—Front View of G. E. 57 Railroad Motor.

on 33-in. wheels, the clearance between the bottom of the motor and the top of the track rail is 3½ in. The clearance between the bottom of the gear case for 67-tooth axle gear and the top of the track rail is 4½ in.

This motor weighs 2,632 lbs. without gear or gear case, and its weight complete, with 67-tooth gear and gear case, is 2,972 lbs.

* The G. E. 52 motor was illustrated and described in *Railroad Gazette* July 9, 1897. For particulars of G. E. 1,000 motor see issue of Aug. 7, 1896.

Foreign Railroad Notes.

Dr. Adolph Koch, of Heidelberg, in a letter to a Berlin newspaper, describes a railroad of very narrow gage from Atami to Odawara, in Japan, which is worked by man power. The cars have seats for four persons on each side, who sit back to back. Two or three cars make a train, which is pushed slowly up a hill by half a dozen coolies. On arriving at the summit, however, the coolies jump upon the platforms, and down goes the train at express speed, to the coast below, which it follows for some distance at such a rate that the passengers close their eyes to avoid the dizzy outlook. So far it is said there has been no accident.

At the International Railroad Sanitary Congress held in Brussels in the first week of September the following were agreed upon as maximum hours of service: For enginemen of fast trains, 8 hours work after 12 hours rest; for enginemen of ordinary trains, 12 to 14 hours duty after 12 hours rest; for station masters at important stations, 12 hours duty and 12 hours rest; for other employees, 12 hours work and 12 hours rest.

The International Sleeping Car Co.—the European Pullman—has had so many complaints of the stealing of passengers' valuables while they were asleep in their berths that it proposes to put a safe in each car or compartment, with a separate drawer for each berth, in which the passenger may himself lock up his valuables and keep the key. The thief, therefore, will need to steal the key before he steals the watches, jewels, etc.

A charter has been granted for a cog-wheel railroad

from Chamonix up a shoulder of Mont Blanc to the Mer de Glace, the most visited glacier. The road will rise 2,910 ft. in a length of 3.4 miles. It will have curves of 327 and 457 ft. radius, and a maximum grade of 1,114 ft. per mile. Not all of it will be worked with the cog-wheel.

The period from July 1 to Aug. 15 is called the "summer travel season" in Germany. During this season the Berlin railroad stations sold, outside of city and suburban traffic, 717,413 tickets in 1895, 780,329 in 1896, and 785,542 this year, when the daily average was 17,077. July 3, when the holidays began, 30,972 tickets were sold. This year 214,423 pieces of passenger's baggage were dispatched in the 46 days; on July 3, 11,665 pieces. This traffic was handled at 10 different stations. So much hand baggage can be (and is) taken into the passenger cars that most travelers absent but two or three weeks would need no trunk. The largest business at one station was 191,395 tickets and 55,622 pieces of baggage.

The General Electric Surface Contact System.

Up to the present the improved Wheeless surface contact system as developed by the Westinghouse Electric & Manufacturing Co.* has stood alone in the attempt at the solution of what is regarded by many as a great difficulty in the application of electricity to street car lines in cities. Experiments stretching over many months have, however, been carried on continuously by the General Electric Co. at Schenectady, and have been carried out on a stretch of the track which forms part of the factory tramway of the company. As the illustration, Fig. 1 shows, the addition to the roadbed between the

Fig. 1.—Experimental Track of G E. Surface Contact System, Schenectady.

rails of the track consists simply in two parallel rows of iron disks, convexed to a height of about one inch above the level of the rail. The car shown in the illustration is a simple factory motor to which the controller, electric motor and storage battery have been fitted. The General Electric Co. is now changing the short experimental trolley lines in its yards to the surface contact system.

Four of the main requirements in a surface contact system are low cost of installation and maintenance; absence of current from all disks not covered by the car; freedom from leakage, and reliability. It is the attempt

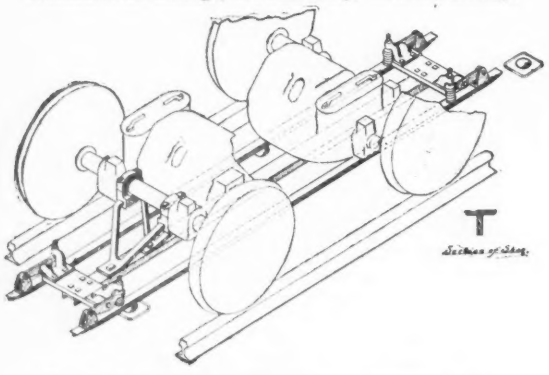


Fig 5.—G. E. Surface Contact, Showing Shoes on Car Truck.

to successfully meet simultaneously all these requirements that has made the problem difficult.

C, *C'* *C''* Fig. 2, represent the automatic magnetic switches and *D*, *D'* and *D''* their armatures or contact makers. *F* is the positive or collecting shoe, *E* the negative return shoe and *G* the track return. *H* and *K* are switches which form part of the controller, the latter connecting in, or cutting out, the cells of a small storage battery, which is used only to energize the coil of the first switch through the plate over which the car passes in starting. After the armature of the first switch has been raised into contact and the line current has completed its circuit, the battery is cut out by the forward movement of the controller handle. In the diagram the car is to move to the right and all the magnetic switches are open. The handle of the controller is turned to the first notch and switches *H* and *K* are closed. Current from the battery flows through a small portion of the motor resistance to the shoe, thence to contact plate *A'*, and the coil *C'* completing the circuit to the ground. The coil *C'*, thus energized raises the armature *D'*, closes the circuit through the automatic switch, and the line circuit completes its path through the motors and through the greater part of the motor starting resistance, shown by the arrows, through the positive plate *B* and shoe *F*. Part of the return circuit goes to the storage cells, which are kept constantly charged, and part through shoe *E*, negative contact plate *A'* and coil *C'* to ground, keeping the latter energized and the automatic switch closed so long as the shoe remains on contact plate *A'*. Moving the controller handle forward from the first notch to the second notch opens the switch *K*, cuts out the battery and sends all the return current through the coil *C'*. The shoes *E* and *F* in the diagram are a little longer than the distance between contact plates. Thus when the car moves forward slightly, the shoe will be in contact with the two contact plates *A* and *A'*, and the return circuit will divide, half going through coil *C'* and half through coil *C*, energizing both and closing the armatures in the switches *D'* and *D*. The car moves forward and the shoe passes beyond the contact plate *A'*. The circuit in the coil *C'* is broken, the armature *D'* drops, cutting out entirely positive plate *B''*, leaving it dead but allowing *B'* still to receive current through the closed switch at *D*. Shoe *F* moving forward then makes contact with plate *B* before it leaves plate *B'*, and the current is uninterrupted in its flow.

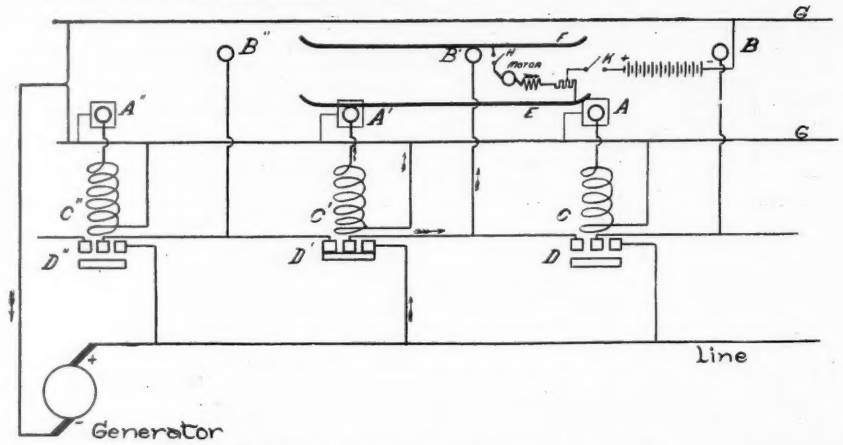


Fig. 2.—Method of Operating G. E. Surface Contact Device.

The automatic magnetic switch, Fig. 4, is one of the most important devices of this system. It has been designed to endure under the severest strains and to act with such uninterrupted precision that the working of the system may not be impaired. Mechanically the switch is simple, strong and durable, with all chances of derangement reduced to a minimum. In the course of the experiments this switch has been subjected to the roughest possible usage and has withstood it unharmed.

If the leakage is great an arc is likely to form when the armature of the switch drops and so long as this is held the contact plate in the street would remain alive, while the arc would burn the switch. It is not practicable to allow the armature to drop far enough to break the arc, and, to extinguish it, the magnetic blow-out principle is brought into play. By the use of this, retention of the arc is impossible. But there is also the possibility of another arc forming in case of an accidental ground on one of the leads to the positive contact plate, or if the forward switch fails to close when the handle of the controller is on the first notch, giving a path to ground through the battery. This is also taken care of by the magnetic blow-out. All surface contact systems have similar conditions to meet, but none have incorporated the magnetic blow-out principle.

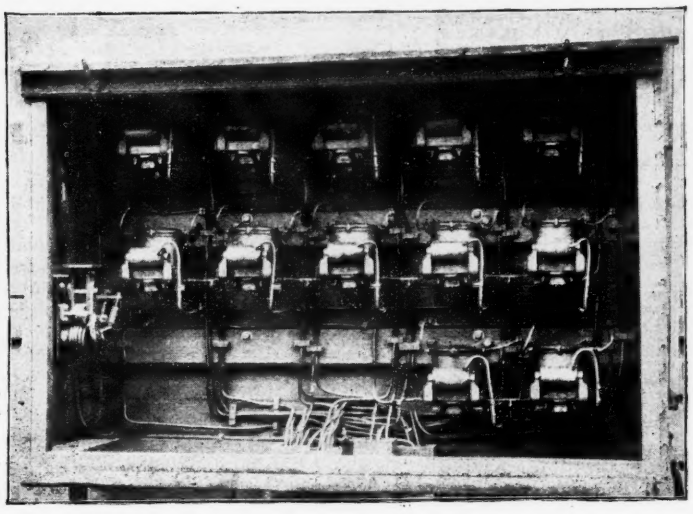


Fig. 4.—Automatic Magnetic Switches in Temporary Manhole of G. E Surface Contact

The form of the contact plates is shown in Fig. 3. They are first set in iron boxes and then surrounded by insulation. The contact plate is essentially a wearing piece screwed into a support and held by a spring washer. This wearing piece can be removed readily without disturbing the support. The standard shoe is 13 ft. long. Its shape and manner of suspension are shown in the sketch, Fig. 5, the ends being curved upward slightly to prevent catching. The shoes are supported from the axles and have a slight upward and downward movement to allow for any irregularities in

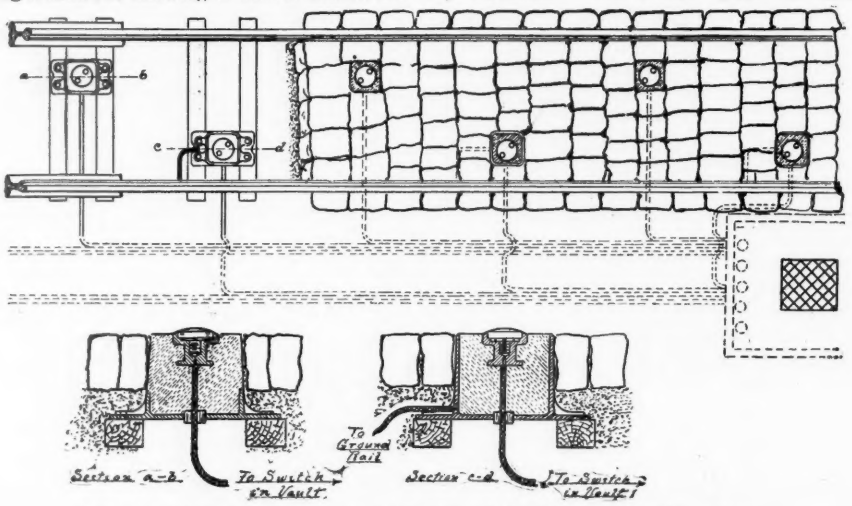
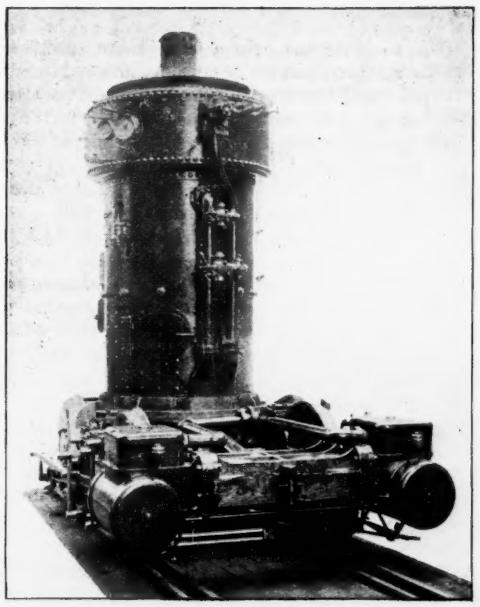


Fig. 3.—Surface of Street and Sections Through Positive and Negative Plates.

*See *Railroad Gazette* July 17, 1896.

the height of the contact plates. The amount of drop in the shoe is regulated by a set-screw.

The automatic magnetic switches are grouped in manholes where they can be readily inspected. Fig. 4 shows a group of these temporarily arranged for exhibition. Each manhole will contain about 20 switches, and the wires from the contact plates to them will be



Boiler and Engines of Steam Motor Car.

protected in similar manner to underground wires for any other purpose.

The battery on a car consists of 10 cells with normal capacity of 50 ampere hours at 5 amperes. It is equal to all emergencies, being called into requisition only momentarily, while being charged. The rest of the time the controller handle is on the first notch.

The operation of the automatic switches is said to be perfect under all conditions as the full line voltage can be secured to close them and they open by gravity. There is no chance of the contact remaining electrified after the car has passed, as by the use of the blow-out on the switch and the switch itself which opens as soon as the current is shut off, all danger and trouble due to live contacts is eliminated. This system is now being put in on the electric roads in Monte Carlo in the principality of Monaco by the Cie. Française Thomson-Houston, over a distance of about 3 miles. It is expected that this will be in operation very soon.

A Steam Motor Car for the New England Railroad.

The Schenectady Locomotive Works has just built a steam motor car for the New England Railroad which will attract considerable attention. On some of the branch lines of this road the traffic is not heavy enough to pay for running steam locomotives and fully equipped trains with crews of four or five men, nor are the conditions favorable to the use of electric traction by trolley, either overhead, surface or underground. We are advised that the idea of using these composite cars on this road originated with Mr. C. Peter Clark, the General Manager. The car shown by the accompanying illustrations was designed by the Schenectady Locomotive Works in consultation with Mr. Clark, and has a seating capacity for 60 passengers and requires but two men to run it.

The car body, formerly used as a dining car, is 64 ft. long, and is carried at one end by a six-wheel passenger truck while the other end rests on the locomotive frame. The locomotive proper, which is inside the forward end of the car, has four coupled driving wheels and a vertical boiler.

We show engravings made from photographs of the side elevation of the car, and also front and side views of the locomotive before it was placed in the car. The locomotive has cylinders 12 in. in diameter by 16-in. stroke, drivers 42 in. in diameter, and the boiler carries a working steam pressure of 200 lbs. per sq. in. The valve motion is a modification of the Walschaert gear. The fuel used is either anthracite coal or coke, and the water is carried in tanks hung under the car. The fuel and water supply carried on the car is sufficient for a run of 60 miles. Westinghouse air-brakes are used, the air pump being attached to the rear of the boiler.

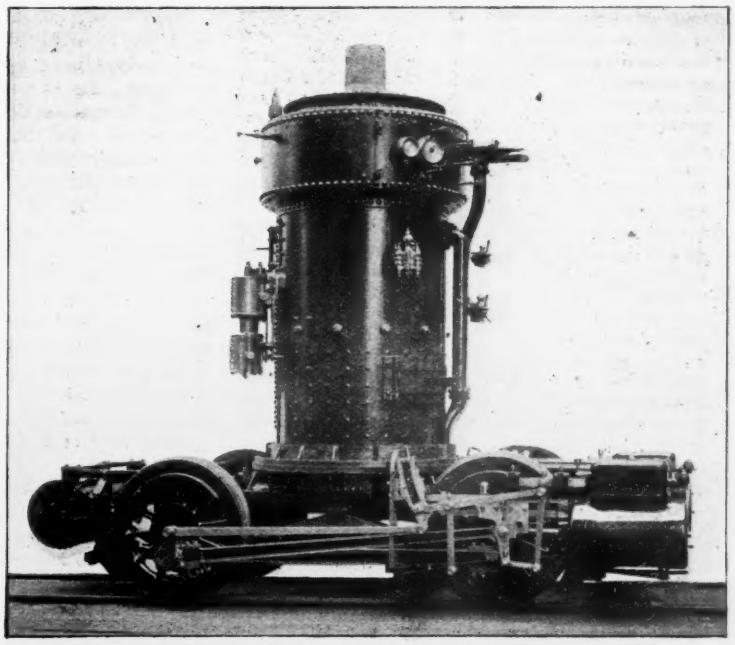
One of the interesting details of construction is the means adopted for avoiding flexible joints in the steam and exhaust pipes, while still permitting the locomotive to swivel freely in passing around curves. It will be seen from the engravings that the boiler is surrounded by a circular casting having a groove in which rest about 125 1½-in. hardened steel balls; a similar casting is attached to the framing of the car which rests upon the balls, thus allowing the locomotive to swivel the same as an ordinary truck. The steam and exhaust pipe connections pass from the boiler to the cylinders inside the ball run-way, so that these connections are made rigid.

The car has not been in service long enough to enable us to give a statement as to its performance, but on a trial trip up a grade varying from 50 to 58 ft. to the mile and three miles long, a speed of 30 miles an hour was maintained when hauling a regular passenger coach as a trailer; while on a level, the car alone, with a quarter-mile start from the first mile post, covered five successive miles in 5 minutes and 55 seconds, as follows:

1st mile.....	1	min.	and	20	sec.—	speed	45.0	miles	per	hour.
2d "	1	"	"	10	" —	"	51.4	"	"	
3d "	1	"	"	5	" —	"	44.6	"	"	
4th "	1	"	"	7	" —	"	53.7	"	"	
5th "	1	"	"	13	" —	"	49.3	"	"	
Average mile....	1	"	"	11	" —	"	50.7	"	"	

American Street Railway Association.

The sixteenth annual meeting of the American Street Railway Association was held at Niagara Falls, Oct. 19 to 22. The President, Mr. Robert McCulloch, of St. Louis, called the meeting to order at 11 o'clock Tuesday morning. The Mayor of Niagara Falls made an address of welcome, which was followed by the address of the President. A resolution was adopted endorsing the aims and objects of the American Street Railway Accountants' Association, which held its first regular meeting at the same time and place. Mr. P. F. Sullivan read a paper on "Municipal Ownership of Street Railroads," which was the outcome of his recent journey abroad to study municipal ownership there, a valuable report of which he has already made in a pamphlet now in print. A paper was read by Mr. G. W. Knox, on "Some of the Difficulties of Construction and Operation." On Wednesday, Mr. Charles Hewitt read a paper on "The Storage Battery as Used in Traction": Mr. Maurice Hoopes, a paper on "Power Distribution, etc." Abstracts of some of these papers will be given next week. A partial list of the exhibits follows:



Boiler and Engines of Steam Motor Car.

EXHIBITS.

The bulk of the exhibits was located on the ground floor of Exhibition Hall. The full size cars and plans were shown on a stretch of track outside the building and some makers of small materials exhibited them in rooms in the International Hotel and Cataract House. Exhibitors were more prompt than usual in getting their displays in position, but there were some delinquents. The following is a pretty complete list of all the exhibits in position Monday evening, but the more extensive exhibits, such as the General, Westinghouse and Walker Electric companies, which deserve more space, will appear in a later issue.

Adams & Westlake Co., Chicago, Ill.—A complete line of electric car fixtures and trimmings, including headlights and Acme curtains and several styles of lanterns.

American Pulley Co., Philadelphia, Pa.—Samples of all wrought steel pulleys.

American Rail Joint & Mfg. Co., Cleveland, O.—Samples of the American Standard rail joints for steam and street railroads were shown in both Exhibition Hall and the International Hotel. Some joints that have been in service on the Pennsylvania and Lake Shore & Michigan Southern Roads were also exhibited.

Barney & Smith, Dayton, O.—A full size Class H (double) truck, and a Class G (single) truck equipped with electric motors.

Bradt & Zimmerman, Troy, N. Y.—A full size Bradt automatic car door handle latch attached to a model of a car door, and a model of a patent eccentric brake for street cars.

J. G. Brill Co., Philadelphia, Pa.—In Exhibition Hall the Brill No. 21 E truck, with forged axle box frame; the Perfect truck, No. 27; Brill's No. 27 D. and No. 22 Eureka maximum traction pivotal trucks were shown in full size, and models of three types of trucks were exhibited at the headquarters of the company in the International Hotel. Outside of the hall, on tracks, was a full-size electric sweeper for street railroads and a new open car built by the company for the Buffalo Traction Co.

Harold P. Brown, New York City.—Sample of the Plastic rail bond referred to in our last issue, and of the E. C. A. bond for rebonding rails without disturbing street pavements. Also a full size portable gasoline engine with flexible shaft for street railroad work.

Buda Foundry & Mfg. Co., Harvey, Ill.—Power drill in service.

E. T. Burrowes Co., Portland, Me.—Full line of samples of car shades and curtains and automatic curtain fixtures for both steam and street railroads.

Cambria Iron Co., Johnstown, Pa.—Sections of T. girder, guard and removable guard rails, angle plates and other track materials for both steam and street railroads.

Central Electric Co., Chicago, Ill.—Complete line of overhead materials for trolley electric roads, Garton lightning arresters, Helions enclosed arc lamps, Billings & Spencer drop forgings, Pittsburgh drawn trolley poles, Hill switches and switchboards, Partridge brushes, Bound Brook bushings, the De Witt sand-box for street cars, a number of specimens of sheet mica and refilling of commutators.

Christensen Engineering Co., Milwaukee, Wis.—A number of automatic air brakes for both steam and street railroads in working order. Also air brakes with independent motor compressors and with compressors driven by the car axles.

Clark Brake Co., Pittsburgh, Pa.—A full-size Clark brake attached to a truck of an electric car to show method of working.

Cleveland Frog & Crossing Co., Cleveland, O.—Safety T rail spring switch for street railroads; spring frog; hard steel center frog and cast steel center frog; derailing switch, poles and cast steel splices.

Consolidated Car Fender Co., Providence, R. I.—Full-size fender attached to a section of a street car.

Consolidated Car Heating Co., Albany, N. Y.—Different types of heaters for street cars and regulation of supply of current shown by means of incandescent lamps.

Continuous Rail Joint Co. of America, Newark, N. J.—Sections of rails fitted with Continuous joints.

Corning Brake Shoe Co., Buffalo, N. Y.—A full line of Corning brakeshoes suitable for all makes of street-car trucks and two brakeshoes, one of which was in service on a passenger car of the Fall Brook Railroad for 35,885 miles, making 13,604 stops, and the other on a locomotive of the same road for 25,553 miles in which 11,280 stops were made.

Crane Co., Chicago.—Crane's patent pop safety valve; steam trap, and wedge gate valves tested to 2,000 lbs. pressure for a working pressure of 800 lbs.

Cravath Mfg. Co., Chicago.—The Cravath excessive current recorder. This recorder, of very simple construction, to indicate to the Superintendent of a road if the motorman on any car has used an excessive amount of current on his trips.

Creaghead Engineering Co., Cincinnati, O.—Overhead line materials; Creaghead flexible brackets; Bourbon strain insulators, and Jaudus long burning arc lamps.

Cutter Electrical & Mfg. Co., Philadelphia, Pa.—A full line of I-T-E circuit breakers, including a 500 amperes, double pole; 300 ampere, single pole [(designed especially for railroad work); a 200 ampere, alternating current circuit breaker, for 2,000 volts, and a 3,000 amperes, double pole; also a sample of street car circuit breakers.

Diamond Truck & Car Gear Co., Kingston, N. Y.—Diamond double truck, Diamond double truck A; Diamond standard truck, No. 5.

Dilworth, Porter & Co., Pittsburgh, Pa.—Samples of the Goldie spike and Goldie claw safety tie-plate of steel, the Harvey grip with rolled thread steel bolts, made by J. H. Sternbergh & Sons, and photographs of Boston subway, showing rails with the Harvey grip.

Joseph Dixon Crucible Co., Jersey City, N. J.—Graphited wood grease to perfectly lubricate and also to deaden the noise in street car bearings; graphite paints for trucks, samples of pure flake graphite and samples of commutator compound.

Duff Mfg. Co., Ltd., Allegheny, Pa.—Different types and sizes of Barrett's patent jacks for cars.

R. Dunrar & Son, Buffalo, N. Y.—Full size Ruggles rotary snow plow for street railroads.

Duplex Car Co., Boston, Mass.—A new combination summer and winter car built by the company was shown in operation on the Great George route. This car was illustrated and described in our last issue.

Electric Storage Battery Co., Philadelphia.—Charge battery cells arranged to show steady control of current of high potential while being discharged.

Falk Mfg. Co., Milwaukee, Wis.—Sections of rails cleaned by a new process; welded joints shown in sections and as finished joints.

Fitzgerald-Van Dorn Co., Chicago.—Full size ball joint for street cars and the Van Dorn automatic street car coupler.

Forsyth Bros. & Co., Chicago, Ill.—Samples of curtains and curtain fixtures for cars.

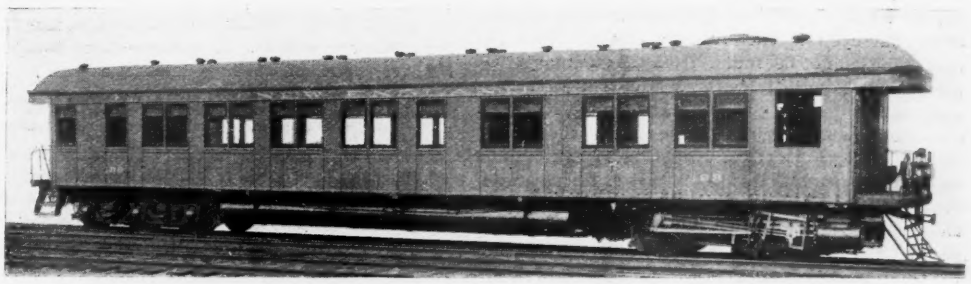
Fuel Economizer Co., Matteawan, N. Y.—Model of Green's patent fuel economizer for power plants.

D. & W. Fuse Co., Providence, R. I.—Recently patented non-arcing fuse for alternating and direct currents of from 500 to 2,500 volts; also fuse boxes for any current.

Gold Street Car Heating Co., New York City.—Electric heaters of every description for heating purposes, including several types of electric heaters for street cars.

Garl Electric Co., Akron, O.—Factory and office telephones, and portable telephones for street railroads. In the latter

(Concluded on page 750.)



Steam Motor Car—New England Railroad.

RAILROAD GAZETTE

ESTABLISHED IN APRIL, 1856.
Published Every Friday,
At 32 Park Place, New York.

EDITORIAL ANNOUNCEMENTS.

Contributions.—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussions of subjects pertaining to* ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

Advertisements.—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers, can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.*

The report of gross earnings for September as compiled by the *Chronicle* is very encouraging. The statement covers 100,000 miles of road and shows a gain in gross of $6,386,000 or 14.14 per cent. over September of 1896. In fact, the *Chronicle* says that in amount this is the largest increase ever shown for one month as far back as its records go; it is larger in fact than for any month of 1880 or 1881. But those earlier reports concerned a much smaller mileage and, in ratio, the improvement has been exceeded many times. Of course the extraordinary grain movement is responsible for a great deal of this gain, a peculiarity of which is the very large gain shown by many individual roads. The Northern Pacific leads with an increase of $635,000, the Missouri Pacific has $606,000, the New York Central $515,000. These are all that have gains of over half a million, but the Canadian Pacific comes pretty near the half-million mark and there are four roads which gained more than one-third of a million. Sixteen roads are recorded with gains of over $100,000 each and only one has a loss of more than $30,000.

The monthly summary of finance and commerce of the United States for August is received, having been corrected up to Oct. 2. In looking over those items of exports of domestic merchandise which are likely to be of most interest to our readers we come first to "cars, passenger and freight and parts of." These are classified now under cars for steam railroads, and for other railroads; last year that division was not made. The total value of cars exported in the first eight months of 1896 was $635,000; in the first eight months of 1897 this total rose to $864,000. Of this amount $689,000 is the value of cars for other than steam railroads. In endeavoring to see where these cars went we find that the countries are given for the whole class—carriages, cars and all vehicles other than cycles. Therefore the destination of the cars alone cannot be found from the summary. Of this class of exports, however, Mexico took $530,000, or more than any other country. The United Kingdom comes next with $378,000. If we include the exports to British North America, British India, Australasia and Africa (much the greatest part of this material must have gone to British South Africa) we find that those countries consumed cars and other vehicles to the amount of $1,026,000, or pretty nearly one-half of the total exports of that class. The exports of cycles and their parts have considerably more than doubled. In the first eight months of 1896 their value amounted to $2,449,000. In the same period of 1897 this value had risen to $5,646,000. Of this England and her dependencies, as specified in the paragraph above, took goods to the value of $2,962,000, or more than one-half of the whole. Germany in this case is the next largest purchaser, having taken cycles to the value of $1,070,000. The exports of pig iron rose in the periods compared (eight months) from $300,000 to $2,053,000. Bars or rods of steel rose from $104,000 to $966,000, and steel rails from $799,000 to $1,662,000. Car wheels continue to be an export of small importance, namely, $75,000 worth in the first eight months of 1896 and $93,000 worth in the same period of 1897. Here again the destination of these particular articles is not given, the whole group of iron and steel and manufactures thereof being considered when the topic of destination is taken up. But we find that considerably more than one-half went to Great Britain and the British dependencies. The exports of locomotives declined in the periods compared from a value of $2,436,000 to $2,231,000. The preliminary report for September gives the value of exports of merchandise and silver as 109¼ million, much the largest value ever reached in one month.

Some of the Relations of Gross and Net.

There were published during the same week recently the reports of three railroad companies whose net earnings were respectively $1,628, $1,832 and $1,935 per mile of road worked. The Oregon Railroad & Navigation Company had the smallest net earnings per mile, the Wabash one-eighth more, and the Chicago, Milwaukee & St. Paul one fifth more. With profits differing so little from each other, let us see how their receipts compare.

The Oregon road earned gross $3,886 per mile, the Wabash $5,954, and the Milwaukee & St. Paul $4,954. Thus, while the Wabash had $2,068 more gross earnings per mile than the Oregon, it had but $204 more net earnings, and while the Milwaukee & St. Paul had just $1,000 per mile gross *less* than the Wabash, it had $103 *more* net earnings. According to criticisms which used to be common in London financial journals this indicates that the Oregon road has been worked very economically and the Wabash wastefully.

But let us look a little further; to make these earnings the Oregon Railroad & Navigation Company had to carry a traffic equivalent to 32 passengers and 245 tons of freight each way daily; the Milwaukee & St. Paul 56 passengers and 488 tons of freight, and the Wabash 96 passengers and 821 tons of freight. Thus the Wabash, to earn one-eighth more net than the Oregon, must carry three times as much passenger and three and one-third times as much freight traffic; and to earn one-eighteenth more net than the Wabash the Milwaukee & St. Paul carried 42 per cent. less passenger and 40 per cent. less freight traffic.

To put the work and the pay side by side we give below the number of passenger and ton-miles carried by each of the three companies for every $1,000 gross and net earned:

To earn $1,000 *gross*—

The Oregon R. R & Nav. Co. carried 6,002 passengers and 45,965 tons one mile.
The Chic., Mil. & St. Paul carried 8,237 passengers and 71,940 tons one mile.
The Wabash carried 11,795 passengers and 99,767 tons one mile.

To earn $1,000 *net*—

The Oregon R. R. & Nav. Co. carried 14,328 passengers and 109,739 tons one mile.
The Chic., Mil. & St. Paul carried 21,085 passengers and 97,019 tons one mile.
The Wabash carried 38,325 passengers and 324,213 tons one mile.

Probably no one will be inclined to charge the Wabash with wastefulness after seeing these figures, which are commended to the attention of those who have forgotten that price as well as cost has something to do with profit; and that to know if a road is "cheaply worked," as they say in England, you must know not only how much it costs to work it, but how much work it does. It will cost no less to carry the traffic if the rate is reduced one half.

Railroad men need not be told that the circumstances which determine the cost per unit of traffic vary almost infinitely; but it is nevertheless worth one's while to know how much work a railroad does for a dollar expended. Now these three companies for every $1,000 of working expenses carried:

The Oregon R. R. & Nav. Co., 10,329 passengers and 79,160 tons one mile.
The Chic., Mil. & St. Paul, 13,517 passengers and 110 859 tons one mile.
The Wabash, 17,040 passengers and 144,127 tons one mile.

This is something like what one would expect, the cost of doing the same amount of work being in inverse proportion to the density of the traffic. The earnings per mile gross and net, depend, of course, also upon the rates, and the Wabash is situated where it is especially difficult to secure an adequate rate.

The Steam Motor and the Steam Tramway.

We had occasion a few weeks ago (*Railroad Gazette*, July 30, page 540) to speak of the possible uses of a steam motor on certain classes of railroads which cannot be profitably or advantageously worked by ordinary locomotives with the ordinary car equipment to which we are accustomed. For instance, there are many miles of country highway now unoccupied by any kind of mechanical motor along which it would be possible to develop a profitable business by the use of a class of track and rolling stock cheaper in construction and in operation than those of the ordinary steam railroad. There are also branches and sections of existing steam railroads on which traffic could be increased by a frequent service of light cars or trains. Cases of this latter class would probably be found not only in the country districts, but in the neighborhood of towns of moderate size.

Or, to state the case a little more specifically, there are branch roads of considerable length where the passenger traffic is so light, because of a scattered population, that trains are necessarily run only at infrequent intervals and where the principal work of the locomotive is in hauling the dead weight of the train. Such service is costly to the railroad and unattractive to the public. Electric traction is often not suitable for such roads on account of the length of the line and the proportionately small number of passengers to be carried. For such branch roads where steam locomotives are used, the amount paid for enginemen and trainmen could be reduced one-half by using motor cars, beside reducing materially the dead weight of the train and the amount invested in equipment. As the present steam locomotives used in such service are for the greater part of the time worked far below their most economical point, it is likely that the smaller engine and boiler plant of the motor car would be quite as economical in the use of fuel; for while being a smaller unit, it would be worked the greater part of the time nearer to its full capacity. And, further, a more frequent service could be given by running single composite cars than would be possible where locomotives were used to haul trains.

It is true that "steam dummies" have long been used, here and abroad, and that a few motor cars of considerable size and engine capacity are in use now, but it is still generally assumed in this country that to meet such conditions as we have suggested above the next step beyond the steam railroad is the electric road. We have ventured to suggest more than once that there is probably a field for the use of steam where the locomotive and car equipment with which we are now familiar would be unprofitable, and where the electric installations with which we are now familiar would also be unprofitable; and also there are many places, especially of the suburban class, where for various reasons electricity (as the art is now developed) is inapplicable.

In the article, or rather the notes to which we have referred as having been published in our issue of July 30, we cited the case of the steam tramways so highly developed in Italy, where 2,000 miles of steam tramway are laid on the high-road and not fenced off, and where these tramways have actually paid a substantial dividend throughout a period of hard times when the steam railroads of the country did not pay.

It is evident that the possibility of the use of the steam motor car in some of the cases which we have specified above is having renewed consideration in this country. We have lately mentioned the fact that the Baldwin Locomotive Works has sent to the Cincinnati, Hamilton & Dayton Traction Co. a car one end of which is fitted with a steam plant and compound engines for turning the truck wheels at that end. A car worked out on the same fundamental idea by the Schenectady Locomotive Works for the New England Railroad is illustrated in this issue. The details are not radically different and the service for which these two motor cars has been designed is essentially the same. We shall not be much surprised if these two cars prove so successful in service as to be the progenitors of a large and robust family.

Annual Reports.

St. Paul & Duluth.—In the fiscal year ending June 30 last gross earnings fell off as compared with 1896, but were larger than in any other recent year. By a considerable saving in working charges, net receipts were $52,296 above last year's total, though about $2,000 less less than in 1895. The income account for two years follows:

	1897.	1896.	Inc. or Dec.
Gross earn.	$1,564,104	$1,587,862	D. $23 758
Oper. expen.	1,147,964	1,224,017	D. 76,053
Net earn.	$416,140	$363,845	I. $52.295
Other income.	59,893	78,099	D. 18,206
All income.	$476,033	$441,944	I. $34,089
All charges and taxes.	354,250	390,848	D. 36,598
Balance.	$121,783	$51,096	I. $70,687
Stumpage income.	119,696	308,160	D. 188,464
Total.	$241,479	$359,256	D. $117,777
Dividends (5 per cent.).	239,505	239,505	
Surplus.	$1,974	$119,751	D. $117,777

Expense of maintenance of way decreased $92,134, which is explained by the fact that in 1896 a large amount of improvement work was going on, in reducing grades, ballasting, new sidings, filling bridges and similar work. In fact, maintenance of way charges that

year were $161,000 higher than the 1895 total. Over $143,000 was spent for betterment work in 1896, and charged to expenses, while in 1897 such expenses were only $37,715, very little work having been done during the past year in the most important improvement the company has in progress, the reduction of grades. A further expenditure of $100,000 will be required to complete the work planned. President Hayes also says that $175,000 will be needed to equip the freight cars with air-brakes and couplers. The engines and passenger cars have already been equipped with safety appliances.

The tonnage last year was a little larger than in 1896, the number of tons moved being 1,200,098, an increase of 63,000 tons or 5.5 per cent. In grain and flour tonnage alone the increase was 106,600 tons, but in almost all other items of freight there were losses, largest in coal, 38,500 tons. The increase in ton-mileage was 16 per cent. The ton-mile rate fell from 9.2 mills in 1896 to eight mills in 1897, the decrease being attributed in the report to active competition and the larger proportion of low class freights carried.

The company's land grants are extensive and valuable, and are an important source of income. The revenue from them is above $100,000 each year, and without these receipts the regular five per cent. dividends on the preferred stock could not be paid. In 1897 such revenue was $120,000 and in 1896, $242,000. The land grants of the St. Paul & Duluth amount to 980,472 acres on June 30, 1897, and those of the Taylor's Falls & Lake Superior Railroad to 57,953 acres. Sales of land during the year were over 32,000 acres.

St. Louis & San Francisco.—One by one the annual reports of the many companies which underwent reorganization in the past few years come to hand, and show ability to earn a margin above the present requirements for fixed charges in a period of quite poor earnings. This company even paid a two per cent. dividend in its first fiscal year and had left a balance sufficiently large to pay four per cent. additional.

The general results of operations are given in the report, so that comparisons can be made with 1896, and we give below the figures for the two years. The mileage operated was 1,162 in 1897 and 1,328 in 1896:

	1897.	1896.	Inc. or dec.
Freight	$4,477,019	$4,212,880	I. $264,139
Passenger	1,026,603	1,249,859	D. 223,256
Mail	189,782	189,375	I. 407
Express	197,488	192,156	I. 5,302
Miscellaneous	102,444	215,101	D. 112,657
Total earnings	$5,993,336	$6,059,371	D. $66,035
Operating expenses:			
Maint. of road and structures	$648,704	$688,919	D. $40,215
Maint. of equipment	544,519	524,476	I. 20,043
Transportation and traffic	2,043,572	2,128,410	D. 84,838
General expenses	246,833	235,027	I. 11,806
Total oper. charges	$3,483,628	$3,576,832	D. $93,204
P. c. exp. to earnings	58	59	
Net earnings	$2,509,708	$2,482,539	I. $27,169

Adding $7,066 of miscellaneous income brings the net revenue up to $2,516,774, out of which was deducted $1,994,524 for interest on funded debt, $171,257 for taxes and $19,927 for other charges. This left a balance of $331,067 on the year's operations, out of which a 2 per cent. dividend on the first preferred stock, which, however, called for only $100,000, was paid.

Though the freight receipts increased six per cent. over those of 1896, the change in the amount of tonnage carried in the two years was not important. In ton-mileage, however, there was an increase of 51,612 million miles, equal to about 14 per cent., or more than double the percentage of increase in freight earnings. A longer haul was obtained, 192 miles against 173.6 miles in 1896. Freight train mileage was 3,434,968 miles, an increase of 251,731 miles, or 8 per cent. The other items of traffic do not show any material change from last year.

The reorganization committee provided a fund of $943,000 for improvements. Of this sum $290,000 was spent during the year for equipment, and $151,600 for new construction. The equipment charges include $67,319 for the purchase of 100 furniture cars, and $44,124 for 50 refrigerator cars. In addition 300 coal cars were purchased from the improvement funds, the cost of which does not show in the 1897 accounts. The net addition to equipment was 375 cars. The cost of equipping freight cars with couplers and air brakes, $162,923, was provided by this fund.

The balance sheet shows cash on hand of $1,437,708, and materials and supplies valued at $398,023; current assets are given as $2,584,302, and current liabilities as $1,470,492. The accounts have been audited by Mr. Stephen Little for the Audit Company of New York.

Rio Grande Western.—The earnings and traffic of the company in the year ending June 30, 1897, show no material changes from the figures of the previous year. The gain in gross was less than one half of one per cent. and as working expenses increased seven per cent., net earnings fell off 9.8 per cent. The general results of the last two years were as follows:

Earnings:	1897.	1896.	Inc. or dec.
Freight	$1,795,923	$1,760,828	I. $35,094
Passenger	525,409	555,193	D. 29,783
Express and miscellaneous	147,170	141,336	I. 5,834
Gross earnings	$2,468,504	$2,457,358	I. $11,145
Working expenses	$1,604,544	$1,499,396	I. $105,147
Net earnings	$863,959	$957,961	D. $94,001
P. c. of exp. to earnings	65	61.02	I. 3.98
Net earnings after deducting taxes and insurance	$758,614	$869,658	D. $111,044

Maintenance of roadway charges increased $74,343, or 31.8 per cent.; for equipment, $172,000 was spent, being $22,461, or 11.5 per cent. less than last year. The larger expenses this year were due to the extensive washouts in September, 1896. Repairs of bridges, track and roadway damaged by these washouts cost $45,088.

The net earnings were sufficient to provide for $628,062 of interest and rentals, leaving a surplus for the year of $131,370, and increasing the total surplus to $426,888. Out of this sum $125,000 was spent for new equipment; a dividend of $250,000, payable in preferred stock was declared. Since the close of the fiscal year the company has resumed the payment of cash dividends on the preferred stock, which were suspended in the summer of 1893. President Palmer, in a letter to the stockholders, dated Oct. 16, discussing the dividend question, gives the net earnings for the three months since June 30 as $350,000, and the surplus above all charges as $167,618. This is more than two per cent. in the stock, and the President states that the earnings to date exceed three per cent. on the preferred stock. Therefore, dividends at that rate have been commenced by a quarterly distribution of three-fourths per cent. General Palmer states that if earnings keep up the directors will divide any profits earned above three per cent. in extra dividends of one per cent.

The miles operated increased during the year from 518 to 550, chiefly by the extension of the Sevier Railway, all of whose securities are owned by the Rio Grande Western.

The coal and ore traffic together gave the company 40 per cent. of the total tonnage in 1897; in 1896 they gave 50 per cent. The decrease is due to the falling off in the ore traffic. The decrease in tonnage from this source was 13 per cent. and in revenue seven per cent. The decline is entirely in the output of the silver-lead districts, the others having shown an increase. On this point the President comments as follows: "Since the close of the fiscal year the fall in silver and equally significant rise in the price of lead threaten to reverse this story. At all events, after three months' experience since the summer's drop in silver began, there appears to be no evidence that its effect on our traffic and earnings has not been largely offset by the rise in lead, which is always particularly sensitive to prosperous or adverse conditions in the country generally."

During the year 288,751 crossties were put in the track, as against 109,124 the previous year; the average number of passenger cars in a train was five, and of freight cars 20, of which 15 were loaded; the freight train load averaged 190 tons, and the passenger trains 66 passengers.

Mr. Daniels continues his vigorous crusade against the ticket scalpers, and has written a two-column letter to the *Buffalo Evening Times*, summarizing the arguments against the toleration of the ticket brokerage business and revealing some of his batteries, so to speak. He quotes the very explicit notice issued by the New York Central, offering to redeem unused tickets, and states that a notice of this kind has been on the advertisements of the road for the last seven years. The Central redeems 100 tickets a day, averaging about $1.50 each in value. Mr. Daniels assures his readers that every railroad of any consequence in the country is equally free in making redemptions. He sends the *Times* a copy of the New York law, in which railroads are required to redeem unused tickets under a $50 penalty; extracts from the Interstate Commerce Commission's annual reports, denouncing ticket scalping; a copy of the report of the Congressional Committee recommending the passage of the anti-scalper bill (H. B., 10,090); testimony given by ticket scalpers before the Supreme Court of New York in February, 1897, concerning stolen tickets handled by scalpers in Buffalo, Chicago and New York; laws of ten states forbidding the sale of tickets except by authorized agents; the law of the Dominion of Canada on the subject; House bill 30 amending the Interstate Commerce act (this is the same as the New York anti-scalper law); resolution against ticket scalping passed by the Railroad Commissioners' convention at St. Louis in May, 1897; a list of 296 newspapers that have published editorials urging the passage of anti-scalping bills; a copy of the opinion of Judge Clark, of Tennessee, who issued an injunction against Nashville ticket scalpers; a circular sent by the New York Central Sept. 14 last to ticket brokers all over the country offering to redeem all unused tickets sold before Sept. 1, 1897, by whomsoever presented; a report of the imprisonment of William A. Burns, a ticket forger now in the Auburn (N. Y.) prison; evidence concerning stolen tickets used by scalpers, and finally a report of the imprisonment of two ticket scalpers under the new law of New Jersey at Atlantic City, N. J., a few weeks ago. These men were sentenced to both fine and imprisonment. A test case against a New York scalper is now pending before the state courts.

The Russian authorities for some time have been pursuing a policy which brings the railroads in the western part of the empire, where they have the greatest strategical importance, into the hands of the state, and unites the other railroads in greater systems worked by companies. To this end it is about to lease the Transcaucasian Railroad, a state line extending from the Black Sea to the Caspian, to the Vladikaukaz Company, which has lines north of the Caucasus, the eastern end of the Black Sea, and is about to open a line along the Caspian to Baku, the eastern end of the Transcaucasian Railroad, which heretofore has had no connection with any other railroad. This lease will give the Vladikaukaz Company the largest system in Russia, about 1,970 miles, in 14 different lines and branches, which lie in one of the most productive grain-growing territories of the world and on which is the great Russian petroleum field.

The train service on the Russian railroads in 1894 was at the average rate of 7.22 trains of all kinds each way daily. About one-third of these were passenger or mixed trains. The car movement was at the rate of 410 car-axles each way daily, and 15 per cent. of these were of passenger and mail cars, which average very nearly three axles per car, which would make 20¼ passenger and mail cars each way daily; the other 85 per cent., substantially all four-wheeled cars, gives an average of 170 freight and baggage cars each way daily. The passenger cars, with an average capacity for seating about 36 passengers, carried on an average 13. The average capacity of the freight cars was 24,060 lbs. (2,250 lbs. more than in 1895), and the average load actually carried was a trifle less than half the car's capacity. The average passenger rate received per mile was 0.75 cent; the average freight rate 0.98 cent per ton-mile. Since 1885 the average passenger rate had decreased one-sixth; the average freight rate, 12 per cent.

The Southern Railway announces that quarantine restrictions have now been removed, so that passengers can go through freely to New Orleans via Atlanta and Montgomery, though sleeping car passengers must change cars at Atlanta. Travelers must, however, provide themselves with health certificates before leaving home. The quarantine regulations in Texas, which had greatly impeded traffic on the Southern Pacific and other lines in the southeastern part of the state, were just being relaxed a little when the new scare of Oct. 10 led to a renewal more strict than before, and all trains between Houston and Galveston were taken off. Freight could not be shipped to Galveston because the cars could not be returned without first being disinfected, and there were not sufficient facilities to do this. After about a week it was announced that many trains had been restored. The Santa Fe resumed two trains between Houston and Galveston. Service on the Southern Pacific on all branches east of Beaumont began last Monday. The San Antonio & Aransas Pass resumed regular service. The New York steamships of the Southern Pacific, which were run to Galveston on account of the trouble at New Orleans, were, on the renewal of the scare at Galveston, sent back to New Orleans. As an instance of the local, not to say the unreasonable, views that prevail in prescribing quarantine regulations, we may note, on the authority of a New Orleans paper, that Port Chalmette, the extensive freight terminal below that city, has been doing its full regular business all the time, no employees being laid off.

NEW PUBLICATIONS.

Electric Railways and Tramways; Their Construction and Operation. By Philip Dawson, C. E. London: *Engineering;* New York: John Wiley & Sons; 530 figures, 183 tables, 705 pages; demi-quarto, half morocco. Price, $12.50.

This book sets forth at length the modern applications of electricity as a motive power for tramways, and contains valuable financial and engineering data as to design, construction, equipment and working of electric roads. The modern and accepted types of machinery and apparatus are illustrated and described in detail. In securing the material for this work, Mr. Dawson visited almost every large city and representative plant of the United States and Europe.

The author's treatment is full and yet discriminating, only such subjects being considered in detail as would prove of service to those connected with street railroads. The author's opinion expressed on the different subjects considered regarding the merits and defects of the apparatus used and the methods employed, make it especially valuable to those desiring to obtain positive statements of the advantages and disadvantages of different methods of construction and operation. True, in some cases engineers may differ with the opinions of the author, but those instances are the exceptions. For example, he condemns too severely the Westinghouse closed conduit because of its possible uncertainty. This is the first time we have heard this method condemned on the ground that the magnets could go wrong and keep the contact knob alive after the car has passed. He also condemns the alternating currents, believing that they have no great advantage, which conclusion may be at variance with the opinions of some who have given the matter a close study. Full particulars are stated regarding different welding methods, but in this case the author reserves an opinion as to the merits of such practice, believing that it is too early to reach a satisfactory conclusion.

This book can be recommended not only to engineers and tramway managers, but also to stockholders, landowners and others who are directly affected by the questions involved in improved and increased facilities afforded by the application of electricity to railroads.

After reading this book one realizes the high development reached by the street railroads in this country and the primitive methods still commonly employed in Europe. On the other hand, some may be surprised to learn of the advance made in a number of the larger European cities within the last few years, particularly in England and Germany. The book is especially

to be commended for its unprejudiced treatment, the facts as the author believes them to exist being stated as such both clearly and frankly. The binding, typography and illustrations are in keeping with a high plane of treatment, but it is to be regretted that a work so valuable should be placed beyond the means of the many directly or indirectly connected with street railroads who would be glad to secure it if published in a less expensive form.

Brown's Discipline Without Suspension is the title of a pamphlet published at Easton, Pa., and for sale by J. S. Koehl & Co., of that city. The price is 17 cents. The pamphlet contains an article on discipline by Mr. G. R. Brown, General Superintendent of the Fall Brook Railroad, which appeared in *Locomotive Engineering* a year or two ago, and other material bearing on the same subject. This other material is mostly in the shape of circulars issued by the Louisville & Nashville, the Southern Pacific and other railroads, at the time they adopted Brown's discipline. The substance of these has been given from time to time in the *Railroad Gazette*. The pamphlet gives these circulars in full, as also statements from roads on which Brown's discipline has been adopted without the issuance of a formal circular. As our readers know, the list of these roads is now quite a long one; at least 30 appear in the pamphlet. On the Norfolk & Southern Railroad, whose circular appears in the pamphlet, semi-annual premiums are offered to station agents, conductors, baggagemen, flagmen, enginemen, firemen, section foremen, bridge tenders and pumpers, those for the higher grades being $25 and the others $15. It appears that premiums are not a new thing on that road. To secure a premium an employee's record must be free from demerit marks and have an unincumbered credit of five merit marks. The Norfolk & Southern has about 100 miles of railroad, doing a light business, and runs steamboat routes aggregating about 400 miles. Premiums are paid also to steamboat masters and mates. From a letter printed in the pamphlet it appears that on the Long Island road, previous to the adoption of "record discipline," there were 146 highway crossing tenders (flagmen or gatemen) whose sense of duty was so deficient that an average of eight extra men was required every day to take the place of absentees. These 146 men are distributed along 10 miles of railroad and a foreman started out with the eight supernumeraries regularly every morning at 6 o'clock. The men who failed to promptly report for duty were suspened from 3 to 15 days each, but the punishment seemed to have very little remedial effect. After the introduction of discipline without suspension there was only one failure in six weeks, or up to the time the statement was made. In that case the man overstept. Since the change, the sending out of the gang of supernumeraries has been found unnecessary. The result, succinctly stated, shows that these flagmen, while perfectly willing to accept a suspension occasionally, are not willing to run the risk of permanently losing their places.

Authors and Publishers. A Manual of Suggestions for Beginners in Literature. By G. H. P. and J. B. P. Seventh edition; rewritten, with additional material. New York and London: G. P. Putnam's Sons. 1897.

This is a book written by publishers for authors and publishers. Indeed, the initials, G. H. P., belong to the head of the Putnam house, and also to the author of three or four books now well known to bookish folks. So we might say that the book is by publishers *and* authors. Being so, it ought, out of respect to the craft, to be physically beautiful—not with beauty of decoration, but of fit material and competent workmanship. Such beauty it has. It is printed on snow-white, rough, hand-made paper, from bold, honest type, in black ink, with marginal rules and rubrics. The title page is printed in red and black. The binding is flat calf and charcoal paper, with just enough gold, and not a bit too much. In brief, the book is made with classical taste.

Its scope may best be suggested by transcribing the sub-title: "Comprising a description of publishing methods and arrangements, directions for the preparation of MSS. for the press, explanations of the details of book manufacturing, instructions for proof reading, specimens of typography, the text of the United States copyright law and information concerning international copyrights, together with general hints for authors." In fact, it is a manual of a large part of the business of writing and making books, and buying MSS., and that it is acceptable as such is evident from the fact that it began its useful career 14 years ago and has gone through seven editions.

Part I., by G. H. P., covers the relations of authors and publishers, publishing methods and arrangements, and the matter of securing copyright. Part II., by J. B. P., covers making books, preparation of manuscript, type-setting, etc., to binding.

We shall not take more space in a "journal of transportation" to write of a manual for authors and publishers, but will merely add that the topics named and suggested in the title page are treated with a surprising range and thoroughness, and further, that as publishers we have found the book at once entertaining, discreet and wise.

Bearings and Lubrication. A handbook for every user of machinery. By A. J. Wallis-Tayler, C. E., Assoc. Mem. Inst. C. E. New York: D. Van Nostrand Co.; 8 vo., cloth, pp. 208. Price, $1.50.

The design of the author in writing this book has not been, as he states, to give a theoretical treatise upon the subject, but to set forth such practical information as may help any user of machinery to make a choice of the proper bearings and lubricants required for different kinds of work. Hence we are not surprised to find that the first chapter is the only one on the subject of friction. As this consists of only 10 pages, it cannot contain anything other than the bare statement of the first principles and a few remarks about the development of the subject. Such being the case, we expect to find the rest of the little work mostly taken up with practical considerations on bearings and their lubrication. This plan is carried out by presenting in the second and third chapters, respectively, the subjects of bearings and stuffing boxes and packings. These are illustrated and described with considerable fullness. Having done this, the work goes on in the three following chapters to treat of the lubrication of bearings, the action of oils on metals and the determination of the lubricating value of oils.

The adulteration of oils is the next taken up, and this chapter is of interest to all users of lubricating oils. Then follows the longest chapter in the book, that on lubricators. In this the author has described the principles and construction of a number of different kinds of oil cups, sight feed and other lubricating devices. Most of these, as in the case of the bearings described, are articles peculiar to English and Continental practice, although the American practice is not altogether ignored. The book closes with a few pages of general observations on the storage of oil and oil cans. The little work contains much information in a concise form.

American and Other Machinery Abroad.—In the early months of this year Mr. F. J. Miller, Editor of the *American Machinist*, made a tour of Great Britain and the Continent for the purpose of looking into the machinery trade and the uses of machine tools in foreign workshops. He wrote many of the results of his observations in the form of letters to the journal which he so ably conducts. These letters have now been collected in a little volume of 90 pages, bound in flexible cloth, which is sold at the price of 50 cents by the American Machinist Publishing Co., New York. The letters are discursive and range freely over a great variety of topics and for that reason are the more interesting. They are not only instructive, but easy and entertaining reading. It is quite obvious that Mr. Miller is thoroughly convinced of the practical skill and ability of the American machine maker and machinist and of the capacity of our people to sell in the markets of the world, but at the same time he does not belong to that class of patriots who can see nothing good away from our own shores.

If we were to make any criticism of the book it would concern the trade mark which embellishes the cover. This is a highly conventionalized spread eagle carrying in one talon a monkey wrench and in the other an engine hammer, and the forward portion of his person is protected by an heraldic shield instead of overalls. We have no deep-seated aversion to the bird as he appears in this design, but for a moment we thought that the *American Machinist* had adopted the black eagle of Prussia. Doubtless other patriotic souls have felt an instantaneous shock in seeing this same trade mark.

Painting Metal Bridges.—By William B. McKenzie, M. Am. Soc. C. E., M. Canadian Society C. E., Assistant Engineer Intercolonial Railway. Published by the author, Moncton, Canada. Price 25 cents.

Mr. McKenzie's pamphlet is a reprint from the *Canadian Engineer* and gives the result of his own studies in the difficult field of the protection of metal structures by paint.

Journal of the Iron and Steel Institute, 1897. Edited by Bennett H. Brough, Secretary. London: E. & F. N. Spon; New York; Spon & Chamberlin.

No. 1, 1897, is Volume LI. of the "Journal" of the Institute. It is a volume of 652 pages, including a copious alphabetical index and a good table of contents.

TRADE CATALOGUES.

The Deane Steam Pump Co., Holyoke, Mass., has issued a new catalogue, for 1897, of pumping machinery. This is 5⅝ in. × 8 in., in paper, and contains 131 pages. Engravings and descriptions are given of a variety of pumps for different classes of service. This company builds horizontal and vertical pumps; single, duplex and triplex pumps; high pressure, compound and triple expansion steam engines, either condensing or non-condensing; also, pumps which may be worked by water, compressed air or electric motors, either direct connected or driven by pulleys and belting. The Deane pumping machinery now in operation for water-works for cities and towns has a daily pumping capacity of over 800,000,000 gals. in 24 hours. Considerable information is also given in the catalogue in the form of tables and formulæ of value to users of pumping machinery.

Light Locomotives.—Messrs. H. K. Porter & Co., of Pittsburgh, Pa., issue the eighth edition of their catalogue of light locomotives It is a convenient octavo volume of 216 pages, in flexible cloth covers, with a good general index and a classification index to designs. This house makes an exclusive specialty of light locomotives which are shown here in 50 distinct designs, and in sizes of from 4 × 8-in. cylinders to 15 × 24, and weights from three to 45 tons. As each design is made in various sizes, there are 494 separate locomotives described in the catalogue. These include electric and compressed air locomotives, for mines and industrial railroads and for street service. In 25 years of business the company has repeatedly enlarged its shops till they now have a capacity of 300 engines a year, and the business has been especially organized with a view to quickly filling orders and to furnishing repair parts expeditiously and cheaply. Each locomotive is made interchangeable with all others of the same size and class, and a full stock of fitted duplicate parts for all standard designs and sizes is always kept on hand. The records of the works show that about 90 per cent. of orders for supplies are filled from stock and within 18 hours of receipt of the order. Of the remainder, five per cent. were filled within two days. Complete locomotives also can be delivered with unusual promptness. This catalogue is arranged with singular completeness to facilitate telegraphic orders. The catalogue ends with some excellent tables for ascertaining hauling capacity, and with a variety of useful information about the special services for which these locomotives are intended.

Worthington Condensers, Pumps, etc.—We have received from the Worthington Pumping Engine Co. and from the Henry R. Worthington Hydraulic Works two recent special catalogues. One of these is a catalogue of jet, surface and self-cooling condensers (the three general types made by the company), being a 12mo pamphlet of 68 pages. There are engravings and descriptions of condensers of various capacities and sizes, and of installations. Furthermore, there is information concerning the installation and utility of condensers, and there are tables of properties of saturated steam, of mean effective pressures and of friction of water in pipes.

The other catalogue is of steam pumps, electric pumps, condensers, etc. This is a pamphlet of the same size as the condenser catalogue and of 48 pages. Pumps of many different styles, sizes and applications are shown, as is also the Worthington water meter.

Pencoyd Shapes.—The Pencoyd Iron Works (A. & P. Roberts Co., Pencoyd, Pa.) issue a pamphlet of 50 pages and 35 lithograph plates of convenient form and size, being pages from advance sheets of the twelfth edition of "Steel in Construction," which will be issued early in 1898. This collection has been made especially for those whose work requires the use of the tables contained in the larger book. All sections have been corrected up to date, and the tables correspond with any changes made. These tables show beams, channels angles, etc., giving weights, areas and dimensions. Other tables give safe load in tons, tabulated by weight of shape and length of span. Other tables show rivet proportions, pins, nuts and bolts. The lithographed plates show dimensions and weights in pounds per foot of a considerable variety of shapes. One of the plates shows a 24 in I-beam, for the first time in the Pencoyd list. These are rolled in sections from 80 lbs. up to 100.

Steam and Electric Hoisting Engines.—The C. W. Hunt Co., 45 Broadway, New York, issues a little octavo catalogue of 24 pages under the above title. This company has long made a specialty of designing and building coal-handling machinery, and has developed an efficient and successful line of engines for hoisting, for steam shovel work, etc. Some of these are illustrated and briefly described in this catalogue. The standard heavy duty engine, built with massive parts and large bearings, is described at considerable length

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The Sterlingworth Railway Supply Co., of Easton, Pa., has issued a new catalogue of switch stands and track tools. It contains illustrations and descriptions of the Sterlingworth inflexible, automatic and rigid switch stands, and the Sterlingworth bridge rail joint, spike puller and spiking bar.

American Street Railway Association.

(*Continued from Page 747.*)

the phones are carried on the cars and in case of accident the conductor can telephone to central office by making connection with telephone wires by means of a special pole.

International Register Co., Chicago.—Full line of registers for single and transfer fares.

The Johnson Co., Johnstown, Pa.—Dupont truck, type "C"; Dupont bogie truck, No. 34 motor made by Steel Motor Co., and Clark hydraulic brake in operation on truck with No. 34 motor; sections of rails frogs, crossings, rail joints and other track supplies.

H. W. Johns Mfg. Co., New York City.—"Electrotherm" car heaters of different types placed under car seats, also full line of insulating material for line work.

Kleanit Co., Akron, O.—Sample of Kleanit for cleaning car bodies and for household use.

Leonhardt Wagon Mfg. Co., Baltimore, Md.—Full size emergency and tower wagons.

McCardell, West & Co., Trenton, N. J.—A full size Trenton trolley wagon.

McGuire Mfg. Co., Chicago, Ill.—Full size No. 28 pivotal truck equipped with G. E. 53 motors and B 7 controller. Standard Al suspension truck. New Columbia car heaters, and patent brake handle.

Mehling Mfg. Co., Cleveland, O.—Samples of the Mehling portable car safe and register and metal car tickets.

Monarch Stove & Mfg. Co., Mansfield, O.—Full size track cleaner for street railroads and a new design intended to also keep the groove in girder rails clean.

Elmer P. Morris, New York City.—Iron poles, overhead line material, gears and pinions, and other supplies furnished by the following companies: Hope Electric Appliance Co., Forsyth Bros. & Co., Point Marion Mfg. Co., Bradford Belting Co., and Keystone Electric Instrument Co. The most interesting part of this exhibit is the Gorton Daniells lightning arresters. The exhibits were made at one end of the Cataract House.

Eugene Munsell & Co., New York City.—Commutator segments, and a large variety of samples of mica, micatine and other insulating material.

Murphy Mfg. Co., Pittsburgh, Pa.—A full-size Murphy car wheel truing machine, showing method of truing wheels without removing them from a car.

New Haven Car Register Co., New Haven, Conn.—Complete line of single and transfer street car registers, the "New Haven" register, and a special double register for connecting roads.

New York Car Wheel Works, Buffalo, N. Y.—Special cold-rolled axles, calapered to $\frac{3}{1000}$ in. the entire length; sections showing cold-rolled, hot-rolled steel and hammered iron axles; machined wheels for both light and heavy electric service, and section of tread and flange showing depth of chill.

A. O. Norton, Boston, Mass.—Norton's improved ball-bearing and ratchet screw jacks, and the Sure Drop track jack.

R. D. Nuttall Co., Allegheny, Pa.—General supplies for street cars.

Ohio Brass Co., Mansfield, O.—Large and complete exhibit of overhead line materials, brass bearings, insulators and other apparatus.

Pantasote Co., New York City.—A tastily arranged exhibit of Pantasote, a substitute for leather for car curtains, upholstery and head linings.

Pearson Jack Co., New York City.—Models of the Pearson jack for replacing derailed cars

Peckham Motor Truck & Wheel Co., New York City.—The exhibit of this company occupied several hundred square feet in the Exhibition Hall and in addition one of the trucks was shown on a track outside the hall and the models in a room in the International Hotel. The largest truck shown was the No. 17, designed for steam railroad service. It weighs 10,000 lbs., and will carry two 150-H. P. motors; the other trucks exhibited include the No. 7 D (single), a number of which are now being made for the Cincinnati Street Railway, the double cushioned No. 14 and the Extra Strong No. 14, the No. 14 8, a short wheel base truck (described in our last issue), the No. 14 C Maximum Traction truck with double cushioned center bearing, the No. 14 D, triple cushioned swing bolster, and the No. 15 swing bolster truck designed for extra heavy, high-speed interurban or elevated service. The models represented the No. 14 and 14 A trucks, the latter arranged to show both the Standard and Extra Long construction and fitted with motors and electric brake. This truck was also illustrated and described last week.

Pettingell-Andrews Co., Boston, Mass.—Samples of the Trojan jack; Perkins' electric switch and the Brilliant metal polish.

Pomeroy & Fisher, New York City.—Complete line of varnishes and stains, especially adapted for cars; Agards' swiveling door hanger for doors in vestibules of street cars.

Pratt & Letchworth, Buffalo, N. Y.—Large variety of malleable iron casting for trucks and motors, besides complete line of castings for street car equipment.

Sargent Co., Chicago.—New design of composition brake-shoes. This method of construction was very recently discussed at some length in the *Railroad Gazette*.

Charles Scott Spring Co., Philadelphia, Pa.—Complete exhibit of spiral and elliptical springs for electric cars.

Skeen Electric Switch & Signal Co., St. Louis, Mo.—Different types of signal lights and a new automatic semaphore signal for street railroads; also apparatus for block signals.

Skeen Regulator Co., St. Louis, Mo.—Automatic magnetic regulators.

Springfield Mfg. Co., Bridgeport, Conn.—Wheel grinder for steam and electric cars. Wheels are removed and centered, and two are ground at the same time.

Standard Air Brake Co., New York City.—Standard, duplex axle-driven compressor and a single-acting, axle-driven geared compressor on a Brill perfect truck; single-acting compressor on axle of Brill, No. 27, perfect truck; standard electric motor compressor; automatic controlling apparatus; hollow spindle brake cylinder and the Standard air reservoir.

D. C. Sweet, Springfield, Mass.—A full size model of a car wheel grinding machine for street railroad use.

Taunton Locomotive Mfg. Co., Taunton, Mass.—One full size share plow for double track roads, built for the Buffalo Traction Co., and a standard nose plow.

Taylor Electric Truck Co., Troy, N. Y.—The Taylor double truck: single truck for closed car and a single truck for open car with extension truss. A truck also for electric roads was shown outside the hall, on a track.

Trojan Button Fastener Co., Ltd., Troy, N. Y.—A full size model of the Ham sand-box for motor and cable cars.

Van Wagner & Williams Hardware Co., Cleveland, O.—Full line of commutator segments made from pure lake copper.

Watson & Stillman Co., New York City.—Hydraulic punch mounted 10-in. girder rail bender and improved Smith rail bender.

Weber Railway Joint Mfg. Co., New York City.—Samples of the Weber joint applied to two girder and one T-rail.

Wells & French Co., Chicago, Ill.—A full-size Curtis truck with the Price momentum friction brake, both of which are now being made by the Wells & French Co. The truck was equipped with electric motors to show the working of the brake.

Wm. Wharton, Jr., & Co., Philadelphia, Pa.—Carver tongue mate, unbroken main line switch, Union Traction Co.'s standard switch, West End Street Railway Co.'s standard switch, Wharton standard switches and crossings.

TECHNICAL.

Manufacturing and Business.

H. A. Lozier, of H. A. Lozier & Co., Cleveland, O., has been elected President of the Greenville Tube Co., of Greenville, Pa., to succeed F. W. Ensworth, resigned. The plant will be equipped with new machinery for making larger tubing and the capacity of the plant increased.

The Kansas City Car & Foundry Co., of Kansas City, Kan., is asking bids for its new foundry building, to be of steel, 104 × 144 ft., set on steel posts, trusses to be 18 ft. centers and 16 ft. in the clear under ties.

The Lamb Fence Co., of Tecumseh, Mich., is building a factory at Adrian, Mich., for making woven wire fence.

The National Steel Castings Co., of Montpelier, Ind., has been formed with a capital of $200,000 to take over the steel castings plant at Montpelier, which was built some time ago by a company which afterward failed. The stockholders of the new company are: C. S. Bash, of Ft. Wayne, Ind.; J. R. Sinclair and T. C. Morrison of Lima, O.; B. H. Whitely, of Muncie, Ind.; J. A. Hindman, of Hartford City, H. Sandhagen and Joseph A. Troy, of Alliance, O., and C. F. Springer, of Chicago. P. H. Whiteley, of the Whitely Malleable Castings Co., is President; C. F. Springer is Vice-President and General Manager, J. R. Sinclair Secretary and C. S. Bash Treasurer.

The new plant of the Reading Car Wheel Works at Reading, Pa., started up Oct. 14. The molding department is 94 × 155 ft., of steel, the cupola building, two stories, of brick, 40 × 80 ft., and a brick storehouse 35 × 200 ft. All of the machinery is run by electricity. The officers of the company are connected with the Union Car Co., of Depew, N. Y.

John B. Carse, Vice-President of Carse Bros. & Co., engineers, Chicago, has returned from a business trip in Europe covering two years.

The Wharton Railroad Switch Co., of Jenkintown, Pa., on Oct. 15, filed a deed of assignment to J. T. Bunting, of the firm of Hannis, Williams & Bunting, of Philadelphia. The deed does not include any real estate. This company has no connection with Wm. Wharton, Jr., & Co., of Jenkintown.

The Cameron-Barkley Co., Charleston, S. C., is in the market for a 3-ft. gage second-hand saddle tank locomotive with cylinders about 10 × 16 in.

L. E. Rhodes, who was for some years connected with the Pratt & Whitney Co., and more recently of the L. E. Rhodes Co., Hartford, Conn., has accepted a position as head of a department of the Davis & Egan Machine Tool Co., of Cincinnati.

The Davis & Egan Machine Tool Co., of Cincinnati, O., has secured an order from the Krupp Works, of Essen, for a number of machine tools through their office at Dusseldorf, Germany.

Bids will be received until Oct. 30 for furnishing and placing in position in tunnel to be built under the Cuyahoga River from Superior street to West River street, Cleveland, about 700 ft. of 48-in. riveted steel water pipe. Geo. R. Warden is Director of Public Works.

The Pittsburgh Testing Laboratory, Ltd., of Pittsburgh, Pa., has been appointed by the City of Chicago as inspector of the 35,000 tons of cast-iron water pipe which the city recently ordered. The order for pipe was divided between the Addyston Pipe & Steel Co., of Addyston, O., and the South Pittsburgh Pipe Works as follows: 117 pieces of 48-in. pipe, 8,360 pieces of 33-in. pipe, 1,540 pieces of 50-in. pipe, 2,490 pieces of 24-in. pipe, 3,350 pieces of 16-in. pipe, Addyston Pipe & Steel Co., total tonnage 32,500 tons; 428 pieces of 12-in. pipe, 3,000 pieces of 8-in. pipe, 6,000 pieces of 6-in. pipe, South Pittsburgh Pipe Works, total tonnage 2,300 tons. We understand that the rate of charge for the inspection is based on tonnage, and is graded with the sizes of pipe, the lowest tonnage rate being made for the 48 and 36 in. pipe.

The General Electric Co., of Schenectady, N. Y., is building a generator for the power-house of the Niagara Falls Hydraulic Power & Manufacturing Co. at the foot of the Cliff at Niagara Falls, N. Y. which the company informs us will be the largest of its kind ever built. It will have 14 poles and will run at 257 revolutions, giving an output of 5,000 amperes at 175 volts, or a capacity of 875 KW. It will be of the latest type connected directly to the water wheel shaft, and provided with a special panel switchboard with full form K equipment of instruments necessary to handle a current of 5,000 amperes. The General Electric Co. now has two of its six-pole 560 KW. 300-revolution 650-volt railroad machines, both directly coupled to the same turbine shaft which supply current to the Great Gorge railroad. In addition the station contains a G. E. booster and two other generators, one of 100 and one of 90 KW.

We are informed that there is no truth in the rumor that G. B. F. Cooper has bought the plant of the Lima Locomotive & Machine Co., Lima, O. The only change that has been made in the management of the company is the employment of Mr. W. C. Mitchell as General Superintendent.

The North-German Lloyd steamer Kaiser Wilhelm der Grosse has been furnished with two Temperley transporters for loading and unloading freight, coal, etc. The Lidgerwood Manufacturing Company, 96 Liberty street, New York City, have the sole rights for the manufacture of the transporter in the United States, and we have already noted its adoption aboard the U. S. battleship Massachusetts.

The Kelly Automatic Car Coupler Co. is being organized at Harrisburg, Pa., to make the Kelly M. C. B. car coupler. J. E. Challenger, Manager of the Philadelphia Car Association, is interested.

The buildings of the Altoona (Pa.) Foundry and Machine Co., recently destroyed by fire, have been rebuilt.

The assignment of the Wharton Railroad Switch Company, whose works are at Jenkintown, Pa., to Joseph T. Bunting, is a decided surprise. It has a record of more than a quarter of a century of successful business and its credit has been unquestioned. No reasons for the assignment are given in the brief notice which comes to us.

Iron and Steel.

The Shenango Tin Plate Co. has awarded a contract to McIntosh, Hemphill & Co., of Pittsburgh, for 30 hot and 28 cold mills, and to the E. P. Allis Co., of Milwaukee, Wis., for the engines for its new plant at New Castle, Pa.

The Porkhouse mills of the Pittsburgh Forge & Iron Co. resumed work Oct. 11, after an idleness of about one year. It is expected that all of the departments in the mill will soon go on full time.

Bids were opened by the Navy Department Oct. 18, for 30 sets of gun forgings for auxiliary cruisers. The bidders not only include the Bethlehem Iron Co. and the Midvale Steel Co., but also the Benjamin Atha & Illingworth Co., of Newark, N. J. The bid of the Bethlehem Iron Co. was 25¼ cents a pound and that of the Midvale Steel Co. was 25½ cents a pound. The Benjamin Atha & Illingworth Co. bid 24 cents a pound and promised to do the work in 210 days.

A company was formed last week by P. L. Kimberly, Geo. A. Baird, R. S. Henderson, Alexander Thompson and W. S. Roberts to work the Kimberly mill at Sharon, Pa.

The plant of the East Chicago Iron & Steel Co., at East Chicago, Ind., remains unsold, no bids having been put in at the Receiver's sale Oct. 12. An effort will now be made to lower the upset price, which we $50,000.

The appraisement of the property of the Pottstown Iron Co., of Pottstown, Pa., which assigned June 8 to the Equitable Trust Co. for the benefit of creditors, places the value at $204,275.54, exclusive of real estate.

It is expected that the 8-in. and 10-in. mills and the puddling departments of the Reeves Iron Co., at Canal Dover, O., which stopped work last January, will resume this week.

The Valley muck-bar mill of the Stewart Iron Co., at Sharon, Pa., is being put in shape to resume work within the next week or two. The mill has been idle for almost three years.

The Scottdale Iron & Steel Co. is making a number of changes in its plant at Scottdale, Pa. The bar and muck mills are being torn out and a new train of sheet rolls and two finishing rolls will be installed. This will necessitate building two pair heating and two sheet heating furnaces and an annealing furnace. An additional cold roll will be built in the new mill department. It is estimated that the improvements and additions to equipment will cost between $25,000 and $30,000.

The Cleveland Rolling Mill Co. has given a contract to Huntington & Lamond, of Pittsburgh, for relining its No. 2 furnace at Newburgh, O. The work will be done and the furnace put in blast as soon as possible.

The Pottsville Iron & Steel Co., of Pottsville, Pa., is considering making extensive improvements and additions to its plant. These will include building two 40-ton open-hearth furnaces, two heating furnaces and a gas producer plant.

The Schoen Pressed Steel Co., of Pittsburgh, has bought the rolling mill plant of the Oliver Iron & Steel Co., at Woods Run, Pa.

The number of men at work at the mills of the Pennsylvania Steel Works, Steelton, Pa., is now about 4,400.

The real estate of the Glendon (Pa.) Iron Co. will be sold at auction Nov. 4.

The Scottdale (Pa.) Iron and Steel Co. is now running its rolling mill to its full capacity. The new iron company at this place will proceed at once to put up the six sheet-iron mills and one bar mill provided for by the plans recently adopted. Of the $150,000 capital stock of the new company $125,000 has been subscribed.

New Stations and Shops.

The Illinois Central is now driving piling preparatory to filling in along the lake front near Twenty-sixth street, Chicago. Upon the ground so made a large roundhouse will be erected, the plans for which are now being made in the Chief Engineer's office.

The Iowa Central will probably build a new passenger station at Oskaloosa, Ia., but no contracts have yet been let.

The Missouri, Kansas & Texas has given the contract for new car shops at Sedalia, Mo., in all 18 separate buildings, to J. A. Daly, of Nevada, Mo., at a price approximating $83,000.

Large Ships for Lake Traffic.

Contracts were let at Cleveland Oct. 12 by the Bessemer Steamship Co., John D. Rockefeller's line, for three steel vessels which will be larger than any yet built on the lakes. The boats, a steamer and two barges, will be built by F. W. Wheeler & Co., of Bay City, Mich. All three must be completed by next May, and together will carry 20,000 tons of ore a trip on a draught of 17 ft., the present draught through lake channels. When the 22-ft. channels are finished, which should be within a year or two, the capacity of the three boats will be over 25,000 tons.

The dimensions of the steamer will be: Length over all, 475 ft.; beam, 50 ft.; depth, 29 ft.; capacity, 6,500 gross tons of ore. It is estimated that 3,200 tons of metal will be used in her construction. The barges will be 450 ft. long over all, 50 ft. beam and 28½ ft. deep, with a capacity of 7,000 tons each. The cost of the three boats will be between $500,000 and $600,000.

It is reported that the Bessemer Steamship Co. is getting estimates on two more boats, a steamer and consort, contracts for which may soon be closed. By the opening of the next season this company will have 21 steel vessels in service and about $4,000,000 invested in vessel property.

It is interesting to note the great increase in carrying capacity and size of lake vessels which has taken place within the last few years. Less than 10 years ago the iron steamer Onoko carried the largest cargo of any lake vessel, having a capacity of 110,000 bu. of corn. Each year has seen an increase in size and tonnage until a few weeks ago, when, as noted in the *Railroad Gazette* Sept. 10, a contract was let to the Cleveland Shipbuilding Co. for a ship 450 ft. long, 50 ft. beam and 28½ ft. deep. This order has now been followed by the one above noted for still larger vessels.

On Oct. 12 the schooner Amazon carried out of South Chicago 230,000 bu. of corn, but none of the large new ships now building on the lakes can get up the Chicago River beyond the State street bridge.

Air-brakes and M. C. B. Couplers on the Baltimore & Ohio.

In an editorial article which appeared on page 727 of our last issue, the statement appeared on the authority of the Interstate Commerce Commission that by Jan. 1, 1898, 80 per cent. of the freight equipment of the B. & O. will be fitted with air-brakes and M. C. B.

couplers. Statistics were given from 40 roads, and of these only 10 equaled or surpassed the B. & O. in the percentage of coupler equipment and only two—the Southern Pacific and the Atchison—in air-brake equipment. This percentage has increased fast on the B. & O. in the last 12 or 15 months. The total number of engines having driver brakes is 70 per cent. in excess of those so equipped in the previous year. The greatest increase, however, was made on freight cars, there being seven times as many in service now with air-brakes as there were 15 months ago. The use of the automatic coupler has been trebled, there being a little over three times as many cars fitted as were used in 1896.

The Receivers have put out of service nearly all of the old iron hopper cars which have been used for many years. Up to Sept. 30, 1,500 of these had been scrapped.

New Water Mains for Chicago.

At the meeting of the Chicago City Council, Oct. 13, the authority asked for by Mr. L. F. McGann, Commissioner of Public Works, to expend $1,000,000 from the water fund in extending the water mains was allowed without objection. The plans prepared by Mr. McGann involve a considerable extension of the water service, and have been made in connection with the new northwest tunnels now in progress of construction. The plans provide for reinforcing the present system of pipes with 35,000 tons of piping ranging in size from 12 in. to 48 in. These pipes are to run from the pumping stations on the new tunnels and connect with the old system of pipes. Contracts have already been let for over 32,000 tons of cast-iron pipe for this work at a cost of about $600,000. These contracts were divided between the South Pittsburgh Pipe Works and the Addystone Pipe & Steel Co., the two lowest bidders. It is expected that the entire work, including finishing the tunnels, will be done and in operation within 18 months at the outside. Contracts already let provide that pipe is to be delivered in eight months from date of contract.

Nicaragua Canal.

It seems as if the United States engineer officer for the Nicaragua Canal Commission has at last been definitely selected. We have announced the appointment of Captain Carter and of Major Livermore, neither one of whom, for some reason, can serve. It is now announced that Col. Peter C. Hains, Corps of Engineers, U. S. A., has been appointed and has accepted. Colonel Hains is one of the oldest members of the Corps of Engineers now in active service, having been graduated from the Military Academy in 1861, and he is a man of such experience and weight that we may believe that the appointment is a fortunate one.

The Nelson Fender Ordinance, Chicago.

On Monday night, Sept. 27, an ordinance was introduced by Mr. C. W. Nelson and passed by the Chicago City Council which requires that all street cars operated on the Chicago surface roads shall be equipped with safety fenders at the front ends, and that wire screens shall be placed along the sides of cars next to the second track. The ordinance, which has been signed by the City Mayor, provides a penalty of not less than $10 or more than $50 per day for every car run in violation of the ordinance. The street railroad companies have been notified that the ordinance will be enforced after Nov. 8. It is estimated that the cost of equipping all the street cars of Chicago will be approximately $100,000.

THE SCRAP HEAP.

The Chicago, Rock Island & Pacific is to run a paycar over all its lines this month, the first time in five years.

The argument of the Joint Traffic Association case before the Supreme Court of the United States has been postponed to Jan. 3.

George Jackson and Charles Williams, robbers, who stopped a train of the Oregon Railroad & Navigation Co., about three weeks ago, have been sentenced to 30 years' imprisonment each.

Superintendent Reasoner, of the Morris & Essex Division of the Delaware, Lackawanna & Western, has posted notices forbidding the practice of riding bicycles across station platforms, and advising station agents that persons violating this regulation should be arrested.

The directors of the Chicago Great Western have voted that stockholders holding five or more shares may be carried over the road free to the annual meeting, provided they have held such shares at least six months. The tickets are good going four days before the meeting and good returning four days after.

On the New York Division of the Pennsylvania Railroad the track patrolmen are now required to make their trips at regular hours, so as to meet one another at the ends of adjoining sections; and they must exchange checks containing a brief record of the hour and of any unusual occurrence. The checks are afterward deposited with signalmen at block signal stations.

The various railroad brotherhoods have met at Peoria and again resolved that they will all federate; and, as usual, Mr. Arthur, the chief of the enginemen, is reported as being one of the parties to the federation; but as in former cases, he seems to have made his promise subject to the approval of the members of his organization, and that, so far as appears, will be as hard to get as ever.

Illinois Railroad Tax Assessments.

The Illinois State Board of Equalization has made up the list of assessments for railroad property for the year 1897. The total is $78,621,936, an average of $8,932 a mile.

The Union Loop.

The Union Elevated Railroad Loop in Chicago is now used by the South Side Elevated, the trains of that company having begun running around the Loop on Monday last. The trains of the Metropolitan and the Lake Street roads, which have been using the Loop for some time, now make the circuit regularly in 18 minutes. It is said that both of these lines are now carrying an increased number of passengers in consequence of the more convenient delivery. The signals at the various junctions on the Loop, put in by the National Switch & Signal Co., have worked perfectly from the outset. For the present the trains of the South Side road will run at the following intervals:

From	7:30 a. m.	to	8:00 p. m.,	every	3 minutes.
"	8:00 p. m.	"	12:00 p. m.,	"	10 "
"	12:00 p. m.	"	5:00 a. m.,	"	20 "
"	5:00 a. m.	"	7:30 a. m.,	"	10 "

The South Side trains are now handled by steam locomotives, but the change to electricity will be made at as early a date as possible; likely about the first of the year. The work on the new power-house at Fortieth street is progressing rapidly and about half the third-rail work is completed.

Electric Railroads in Germany.

The development of electric tramways in Germany has recently been pretty active. At the end of 1891 such tramways existed in only three places; in 1892 two others were established. In August, 1895, 42 German cities had electric tramways, since which time the number has nearly doubled. Most of them have overhead conductors, which system is used exclusively in many important towns. The three Berlin electric lines have the mixed system, with overhead and subterranean conductors. At Dresden and at Hanover are electric tramways worked by trolley current and others worked by accumulators.

One Hundred Miles an Hour Again.

Some months have passed since the building of the last elevated railroad between New York and Chicago to carry trains at 100 miles an hour, or even 200. But this perennial scheme has again appeared with the ripening of the chestnut crop. The Transcontinental Railroad got a charter from the Illinois Legislature something more than two years ago. It is capitalized for $200,000,000, and the Chicago dispatches say that "a large portion of this stock is already paid up." Now the company has executed a trust deed with the Equitable Trust Co., of Chicago, as trustee and proposes to issue $100,000,000 of five per cent. gold bonds. We are glad that they are gold bonds and that they carry five per cent. interest. Currency bonds or coin bonds at 3½ per cent might have been difficult to float, even for so meritorious a project. The purpose now is to build an elevated railroad at least 8 ft. high from Chicago to Jersey City. The President of the concern says: "We have several routes to select from. What we desire is as straight a route as possible." Naturally so. There seems to be some confusion as to whether the distance will be 700 miles or 900 miles, but we should suppose that with any tolerably good map and a pair of dividers the distance could be stepped off accurately enough to enable the controlling officers to decide upon the amount of bonds to be issued at once.

100 Miles an Hour—Perhaps 104.

About the middle of September a Columbus (O.) newspaper published the statement that an engine on the Pittsburg, Cincinnati, Chicago & St. Louis Railway while running from Kokomo to Logansport with a train of four cars, including a heavy Pullman chair car, had made one mile in 34½ seconds; that is to say, at a rate of over 104 miles an hour. On inquiry from the engineer, Mr. Patrick Graney, it appears that the time was taken with a stop watch by the editor of an Indianapolis paper while riding in the cab. Mr. Graney thinks, however, that the time was "exaggered a little." What particular reason he has for thinking so we do not know, but at any rate his caution is creditable. The editor of the Indianapolis *News* is positive that his time was correct. If he had been mistaken by half a second, and the time had been 35 seconds, the speed would have been almost 103 miles an hour. If he had made an error of a full second and-a-half the speed would still have been an even 100. We are probably therefore justified in entering this among the fairly well authenticated cases of an engine reaching, in service, with a train, at a speed of over 100 miles an hour for at least one mile. This engine is No. 340, class "O," eight-wheeler (4 drivers), built at Altoona in 1892. The cylinders are 18 in. × 24 in., the drivers 68 in. diameter and the boiler pressure 160 lbs.

Reductio ad Absurdum of State Rate-Making.

AUSTIN, Tex., Oct. 2.—It is ordered that notice be and the same is hereby given to all persons interested that the railroad commission of Texas will on Tuesday, Oct. 19, 1897, at its office in Austin, take up and consider the matter of a proper classification for a piece of machinery known as one man drag saw. Upon the strength of the description furnished the commission it will be proposed to give the article the rating of first-class.

Persons interested in this matter are requested to present their views in regard to the same to the commission on or before the date of hearing.

JOHN H. REAGAN,
Chairman;
L. J. STOREY,
ALLISON MAYFIELD,
Commissioners.

Passenger Methods in the Freight Department.

The officials of the Rock Island are deriving considerable amusement from a news item which appeared in the El Reno (O. T.), *Evening Star* a few days ago. The item is as follows:

"Fourteen cars of cattle belonging to Ben Tungle and T. W. Hollingsworth became frightened last evening while awaiting shipment in the Choctaw pens. They broke out and made a straight shoot for the Rock Island yards. They were finally headed into that road's pens, and were shipped north this morning over the Rock Island route. The cattle evidently preferred being shipped over the Rock Island." The Rock Island people say that it was intended the cattle should go to market via the Choctaw and Santa Fe roads, but on arriving at the pens and discovering that they were to be shipped over the above named roads, they stampeded for the Rock Island yards in order to get the accommodations of the Montgomery sleeping cars.—*Exchange.*

Street Railroads in Massachusetts.

The Massachuetts Street Railroad Commissioners are pushing their investigation into the relations of municipal corporations and street railroads. Commissioner Hayes informed a representative of the *Railroad Gazette* that while he was finding nothing which indicated that any other state had a better method of dealing with the questions of franchises and taxation than Massachusetts, he was obtaining much valuable data for use later, and was gradually working it into shape. He has just returned from a trip through western cities, Buffalo, Detroit, Chicago, Cincinnati, Indianapolis and St Louis being visited. He says that the conditions in each of these places were very satisfactory from the standpoint of administration and equipment, but that on the question of conditions of franchise they are all mixed up. All the cities are "electrified," as they express it, and this has made a new question of railroading through the highways, which they seem unable to solve satisfactorily as yet. More than this, he finds that in those cities where there are competing lines, the rival companies secure entirely unequal concessions from the local municipal boards, in the ratio of their influence. Of course consolidation is therule, and this makes the problem easier in cities where one company is in control of the streets. A recent trip to Montreal convinced him that that city has the best methods of dealing with street railroad corporations of any he has yet visited, but he thought the Massachusetts way was preferable to that of any western city. This week he starts again, with Mr. Allen, Clerk of the Commission, and will inspect the conditions in Philadelphia, Pittsburgh, Baltimore, Richmond and probably Washington, though there a commission governs. Meanwhile, Commissioner Charles Francis Adams is busy in the same work of investigation in European cities. He is expected to return in two or three weeks, and then the hearings of the Commission will begin. The report, in whole or in part, must be submitted Feb. 1, 1898.

LOCOMOTIVE BUILDING.

It is reported that the Lake Erie & Western is in the market for locomotives.

The Omaha, Kansas City & Eastern has placed an order for ten 10-wheel locomotives with the Baldwin Locomotive Works.

The Astoria & Columbia River has ordered one 8-wheel locomotive from the Schenectady Locomotive Works, Schenectady, N. Y.

The Brooks Locomotive Works, Dunkirk, N. Y., has received an order for 25 locomotives of 5-ft. gage from the Finland State Railroad.

The Cooke Locomotive & Machine Co., of Paterson, N. J., is building three 10-wheel locomotives for the Astoria & Columbia River Railroad. They will have 20 × 26 in. cylinders.

The Baldwin Locomotive Works have received an order for four freight locomotives for the Rio Grande Western. This is in addition to the four locomotives referred to in our issue of Sept. 24.

The Wabash has decided not to place orders for locomotives, for which it was in the market, as noted in our issue of Sept. 17, but will build one engine at the Springfield shops of the road.

The five 12-wheel freight locomotives ordered some time ago by the Chicago & Eastern Illinois from the Pittsburgh Locomotive Works, as noted in our issue of Sept. 3, will be delivered the last of this month.

In our last issue we described some engines for the Seiwa Railway of Japan, and for the Seoul-Chemulpo Railroad of Corea, and stated that they were to be built by the Schenectady Locomotive Works. This is an error. The Brooks Locomotive Works, of Dunkirk, N. Y., have the orders for building the engines referred to, and we are indebted to them for the descriptions published.

The Brooks Locomotive Works, of Dunkirk, N. Y., are building 20 eight wheel passenger locomotives for the Imperial Government Railways of Japan, the order for which was noted in these columns at the time it was given. They will have 15 × 22 in. cylinders, 54-in. driving wheels, radial-stayed straight top boilers with brass tubes 54 in. in diameter, and a sloping firebox of copper. The engines will weigh in working order about 72,000 lbs. and will burn bituminous coal. The tenders will have six wheels and weigh about 50,000 lbs. in working order. The boiler pressure will be 160 lbs. Engine and tender truck wheels will be steel-tired and automatic vacuum brakes will be used for driving wheels, tender and train service.

CAR BUILDING.

The Seaboard Air Line is in the market for 450 box and 200 flat cars.

The Southern Pacific has ordered 10 passenger cars from the Barney & Smith Car Co., of Dayton, O.

The Astoria & Columbia River has ordered 24 passenger cars from the Barney & Smith Car Co., Dayton, O.

The Canadian Pacific has put in service a commissary car to be used for storing and cooking food for troops and marines when traveling over the road.

Nelson Morris & Co. are now ready to close the contract for 200 refrigerator cars, for which they were in the market some time ago, when the order was temporarily deferred.

We are informed by the Vice-President and General Manager of the Baltimore & Ohio Southwestern that the report that the road is in the market for new cars is incorrect.

We are informed by the General Manager of the St. Paul & Duluth that there is no prospect that new freight cars will be ordered at this time, as reported by a contemporary last week.

Mr. T. D. Dale, Receiver and General Manager of the Toledo & Ohio Central Extension Railroad, informs us that the report that that road will build or buy several hundred freight cars this winter is incorrect.

The Buffalo, Rochester & Pittsburgh has ordered 100 freight cars of 80,000 lbs. capacity from the Jackson & Woodin Mfg. Co., of Berwick, Pa. The same company has ordered 100 additional freight cars from the Buffalo Car Co.

The Minneapolis & St. Louis has not yet determined upon the purchase of new equipment, as reported in Chicago last week, but we are informed by the General Manager that it is probable some freight cars will be bought by his road within the next few months.

A contemporary last week published the report that the Chicago, Milwaukee & St. Paul was taking bids on 500 box cars. We are informed by the General Manager

that the bids were asked for some time ago, but the cars will probably not be built until next year.

The Atchison, Topeka & Santa Fe has ordered 100 refrigerator cars of the Wells & French Co., Chicago. The cars will conform to the Atchison standard in every respect except some special refrigerating features, which will be after patents belonging to the Wells & French Co.

The Ann Arbor Railroad Co. is in the market for 300 box cars The specifications call for cars of 60,000 lbs. capacity, with an inside length of 34 ft.; two center sills; four intermediate and two side sills; one end door and two side doors. The trucks will be the standard diamond trucks; journal boxes M. C. B. standard for 4¼ × 8-in. journals, with malleable iron lids; M. C. B. journal wedges, secured with malleable iron key, made by Fulton Iron & Engine Co., Detroit. The specifications also call for Detroit drawbar springs, Hutchins' roofs and "Armour" wood brake beams. Westinghouse air-brakes and Trojan couplers are to be furnished by the railroad company.

BRIDGE BUILDING.

Allentown, Pa.—The court has directed that a bridge be built next year over Mill Creek between Whitehall Station and Laury's.

Atlanta, Ga.—The County Commissioners have decided to build a bridge over Peachtree Creek.

Bridgeport, Conn.—The city has appropriated $20,000 for the Yellow Mill bridge. The plans for this structure, which have been approved by the Secretary of War, contemplate a bridge estimated to cost $70,000.

Burk's Falls, Ont.—The Village Council has decided to build a steel bridge over the Maguetawan River, on the site of the old structure. A grant for this work has been made by the Dominion government.

Columbus, O.—Bids are asked Oct. 26 for the approaches for the Central College bridge. W. H. Halliday, County Auditor.

The contract for the superstructure of the Central College bridge has been given to the Columbus Bridge Co., at $5,580. Schwartz & Co. got the contract for the substructure at $4,827.

Malden, Mass.—The Aldermen are considering a project for abolishing all the grade crossings of the Boston & Maine in Malden on both the Western Division and the Saugus Branch.

New Haven, Conn.—The East Rock Park Commissioners will build a foot bridge over Mill River at Willow Path; cost about $5,000.

New York.—On Oct. 11 the Park Board approved plans for the new City Island bridge, to cost $250,000, and for a bridge across the Harlem at Lenox avenue.

Oceanport, N. J.—The Secretary of War has approved the location and plans for a bridge to be built by the Board of Chosen Freeholders of Monmouth County, over the South Shrewsbury River.

Rockford, Ill.—The contract for a plate girder bridge over Keith's Creek at Seminary street has been given to the Wisconsin Bridge & Iron Co., at $1,140.

Towanda, Pa.—The contract for a county bridge across the creek at Milltown, between Sayre and Waverly, has been let by the County Commissioners to the Owego Bridge Co. at $1,729.

Vina, Cal.—The Southern Pacific, it is said, contemplates building a steel bridge across Deer Creek in the Sacramento Valley, near here.

West Carrollton, O.—It is stated that bids are asked Oct. 30 for the substructure and iron work of a swing bridge over the Miami and Erie Canal. A. G. Feight, County Auditor.

Woonsocket, R. I.—An ordinance was passed by the Board of Aldermen on Oct. 11, appropriating $4,500 for the Wood avenue bridge.

Youngwood, Pa.—A new bridge will be needed over the creek near here to take the place of the one that collapsed.

MEETINGS AND ANNOUNCEMENTS.

Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

Cincinnati, Hamilton & Dayton, quarterly, new preferred, 1¼ per cent., payable Nov. 8.

Great Northern, quarterly, preferred, 1½ per cent., payable Nov. 1.

Nashville, Chattanooga & St. Louis, 1 per cent., payable Nov. 1.

Norfolk & Western, preferred, 1 per cent., payable Nov. 15.

Rio Grande Western, quarterly, preferred, ¾ per cent. payable Nov. 15.

Rome, Watertown & Ogdensburg, quarterly, guaranteed, 1¼ per cent., payable Nov. 15.

St. Paul, Minneapolis & Manatoba, quarterly, guaranteed, 1½ per cent., payable Nov. 1.

New England Street, New Haven, quarterly, ¾ per cent., payable Oct. 15.

New Orleans & Carrollton, quarterly, 1½ per cent., payable Oct. 20.

Stockholders' Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

Catasauqua & Fogelsville, annual, for election of directors, Philadelphia, Nov. 1.

New England, annual, for election of directors, Hartford, Conn., Oct. 28.

Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The *American Society of Civil Engineers* meets at the House of the Society, 127 East Twenty-third street, New York, on the first and third Wednesdays in each month, at 8 p. m.

The *Association of Engineers of Virginia* holds its formal meetings on the third Wednesday of each month, from September to May, inclusive, at 710 Terry Building, Roanoke, at 8 p. m.

The *Boston Society of Civil Engineers* meets at 715 Tremont Temple, Boston, on the third Wednesday in each month, at 7:30 p. m.

The *Canadian Society of Civil Engineers* meets at its rooms, 112 Mansfield street, Montreal, P. Q., every alternate Thursday, at 8 p. m.

The *Central Railway Club* meets at the Hotel Iroquois, Buffalo, N. Y., on the second Friday of January, March, May, September and November, at 2 p. m.

American Association of Traveling Passenger Agents.

At the twenty-fifth annual meeting of the American Association of Traveling Passenger Agents, which was held at Nashville, Tenn., Oct. 12 and 13, Elliott T. Monette was elected President, R. G. Cowardin Vice-President and L. W. Landman Secretary.

Western Foundrymen's Association.

The regular fall meeting of this Association was held at the Grand Hotel, Cincinnati, O., on Oct. 18, 19 and 20. The papers presented and discussed were: "The Value of Physical Tests," by S. S. Knight; "Comparative Fusibility of Foundry Metals," by Thomas D. West, and "Molding Sand," by D. H. Truesdale. Visits of inspection and pleasure excursions were made in and around the city.

The Civil Engineers' Club of Cleveland.

The October meeting of this Club was held in Case library on the 12th inst. Mr. Frank C. Osborn was elected Vice-President, this office having been left vacant by the resignation of Mr. Clarence M. Barber. The paper of the evening, entitled "The Mechanical Side of Steel Making," was read by Mr. John MacGeorge. The latest methods and devices for mechanically charging the steel furnace were described and illustrated by lantern views.

Western Society of Engineers.

The Western Society of Engineers held a regular meeting at the Technical Club, Chicago, Wednesday evening, Oct. 20. By special invitation a number of ladies were in attendance. Mr. Octave Chanute, C. E., presented an interesting and valuable paper, entitled "Gliding Experiments," which was illustrated by about 40 stereopticon views. Mr. Chanute has made a thorough study of the subject of aerial navigation, and, beside many experiments which he has conducted personally, is familiar with the work which others have done along this line.

General Baggage Agents.

The American Association of General Baggage Agents held its annual meeting at Denver, Oct. 13 and 14. The matter of the transportation of dead bodies was discussed in connection with the report of a conference which had been held with state and local Boards of Health. It was the sense of the meeting that extra baggage should be sent C. O. D. as little as possible. A letter was read from the First Assistant Postmaster General ruling that railroads could carry return baggage checks in sealed envelopes without being liable for postage. The officers elected for the ensuing year were: President, Andrew Traynor (U. P.); Secretary, J. E. Quick (G. T.) The next meeting will be held at Detroit, July 20, 1898.

North-West Railway Club.

At the regular meeting of the North-West Railway Club, held Oct. 14, two papers by Prof. J. H. Gill on the "History of Blacksmithing and Method of Instruction in Forge Work at the State University," and "Tool Steel and Tool Dressing," were discussed by Horace Pentecost, Foreman Blacksmith, Northern Pacific Railway. Mr. Geo. Dickson, General Foreman of the Great Northern Railway, presented a short paper on the "Shrinkage of Firebox Steel." The annual election was held and the following were elected: President, Tracy Lyon, Master Mechanic, Chicago Great Western; First Vice-President, Geo. Dickson, General Foreman, Great Northern; Second Vice President, Prof. H. Wade Hibbard, University of Minnesota; Secretary, T. Foque, Assistant Mechanical Superintendent, M., St. P. & S. Ste. M. Ry.; Assistant Secretary, F. B. Farmer; Treasurer, A. Childs, General Car Foreman, Northern Pacific Railway.

Western Railway Club.

The catalogue of the David L. Barnes Library, compiled by H. de K. Woods, Librarian, has just been issued. The catalogue is the same size as the *Club Proceedings*, contains 22 pages and was prepared under the direction of the Library Trustees. It shows that there are now in the library 824 volumes of books, pamphlets and engineering files, the latter being large scrap books, containing notes and information collected by the late David L. Barnes during his practice as a Consulting Mechanical Engineer. In the catalogue the books are shown both by title and under the name of the author, the author's name in such cases being printed in italic type. The classification separates the books into eight groups, those in each group appearing in the catalogue in alphabetical order.

The object in issuing the catalogue at this time is that the library may thus become of more use to those members of the club who live outside of Chicago.

Society of Naval Architects and Marine Engineers.

The fifth general meeting of the Society of Naval Architects and Marine Engineers will take place in New York City, at 10:00 a. m. Thursday, Nov. 11, 1897. Through the courtesy of the President and Managers of the American Society of Mechanical Engineers, the meetings will be held in the auditorium of No. 12 West Thirty-first street, the sessions continuing through Thursday and Friday, Nov. 11 and 12. There will be a banquet at Delmonico's at 7 p. m., Friday, Nov. 12, to which members and their guests are invited. A list of the papers to be read at this meeting follows:

Watertight Bulkhead Doors. The "Long-Arm" System on the U. S. S. Chicago. By William Barnum Cowles, Esq., member.

Regulations for Loading Vessels. By Lewis Nixon, Esq., member.

Torpedo-Boat Design. By Assistant Naval Constructor H. G. Gillmor, U. S. Navy, Associate.

The Commerce of the Great Lakes. By C. E. Wheeler, Esq., member.

Progressive Trials of the "Guardian." By Prof. C. H. Peabody, member.

An Experimental Study of the Influence of Surface upon the Performance of Screw Propellers. Preliminary Paper. By Prof. W. F. Durand, member.

Some Notes on the Speed Trials and Experience in Commission of our New Battleships. By Chief Constructor Philip Hichborn, U. S. Navy, Vice-President.

Performance of Scotch Boilers and Their Durability Under Forced Draught. By Edwin S. Cramp, Esq., member.

Use of Water Ballast for Colliers in the Pacific Coast Trade. By William P. Frear, Esq., member.

Estimated Weights of Machinery. By Prof. George R. McDermott, member.

Navy Yard Expenses. By Naval Constructor W. J. Baxter, U. S. Navy, member.

Pneumatic Steering Gear as Applied to the U. S. Monitor Terror. By H. A. Spiller, Esq., member.

The Franklin Institute.

The subject of Improved Furnaces and Automatic Stokers was continued for final consideration at the stated meeting of Oct. 20. The following devices were considered by representative or by correspondence, illustrated with the aid of lantern projections, viz.:

Murphy Iron Works, Detroit, Mich., manufacturers of the Murphy Automatic Stoker.

McKenzie Furnace Company, Chicago, Ill., manufacturers of the McKenzie Smokeless Furnace.

American Stoker Company, Dayton, O., manufacturers of the American Stoker.

Col. C. Wolsley Coxe, of Philadelphia, will represent the Hutchinson Smokeless Furnace.

Bowe & Co., Chicago, Ill., manufacturers of the Black Diamond Smokeless Furnace.

Columbia Stoker Company, Holyoke, Mass., manufacturers of the Columbia Mechanical Stoker.

The Falls Rivet & Machine Company, Cuyahoga Falls, O., manufacturers of the Acme Mechanical Stoker; represented by Mr. William E. Gray, New York.

The Coxe Iron Manufacturing Company, New York, manufacturers of the Coxe Mechanical Stoking Furnace; represented by Mr. M. C. Jenkins, New York.

The Arndt Econometer, manufactured by Joseph Wilckes, New York; represented by Mr. Arthur Falkenau.

The report of Prof. Jos. W. Richards, the Institute's Delegate to the Seventh Session of the International Congress of Geologists, at St. Petersburg, was presented.

The Board of Managers lately decided that it would be prudent to convert a portion of the building into a fireproof structure, in which the valuable library of the Institute could be placed, and made as safe against destruction by fire as practicable, so long as the Institute should be compelled to occupy its present quarters. The change, when completed, in a few months, will likewise provide a much larger space for the reading-room and for the display of models and apparatus, and for general museum purposes.

The Engineers' Club of Philadelphia.

At the regular meeting of this Club, held on Oct. 16, the special committee of the Board of Directors, appointed to consider the advisability of establishing a standing committee of the Club to inform the members of pending legislation of engineering interest, presented the following resolution through its chairman, Dr. Henry Leffmann:

"*Resolved*, That there shall be established a standing committee of seven members, appointed from the active membership, to be called *The Committee on the Relations of the Engineering Profession to the Public*.

"The said committee shall be appointed by the President as soon as practicable after his election, and shall serve until its successor is appointed.

"It shall be the duty of this committee to inform the Club of any public action or contemplated legislation, national, state or municipal, affecting the engineering profession as a body or the rights and privileges of engineers, and to perform such other duties concerning the relations of the Club to the public as may from time to time be referred to it." The resolution was adopted.

THE DELAWARE RIVER BRIDGE AT EASTON, PA.

Prof. J. M. Porter read a paper on the above subject, postponed from the meeting of Sept. 18. He described the history and engineering features of the old wooden bridge connecting Easton, Pa., with Phillipsburgh, N. J., and of the steel cantilever bridge which was built to replace it.

The old wooden bridge consisted of three spans, 163 ft. clear, composed of two through trusses 27-ft. centers, and one center-deck truss. The whole structure was enclosed by weather-board siding and a pine shingle roof, which enclosure extended some 25 ft. back of each abutment, making a total length of 600 ft. The trusses were in the form of a braced arch, with an attempt to continuity by having their top chords united at the piers. This attempt failed to accomplish the purpose intended, as the joints of these members were good only for compression and would open and close upon the passing of a heavy load over the bridge. The skew-backs were also continuous over the piers, abuting each other, and depending wholly upon frictional resistance to maintain their position relative to the pier.

During 1856 iron tie-rods were introduced alongside of the nearly vertical timbers of the truss, and about the same time iron diagonals of the top lateral system replaced the old wooden ones. With these changes and additions, and with several renewals of the roof and siding, the superstructure was at the time of its entire removal (1895–6) as originally constructed. The lumber was white pine, supposedly cut from the near vicinity, and its condition when removed was very good, rot being found in only a few places, mostly stringer-ends and floor-beams.

The substructure consisted of two abutments about 17 ft. thick, and two piers, of which the one on the Pennsylvania side was 38 ft. wide and 48 ft. long, while the one on the New Jersey side was 32 ft. wide and 43 ft. long, both piers being hollow, with side-walls about 10 ft. in thickness. The masonry was composed of stone of all sizes and shapes, laid up with lime mortar, and although this construction would not, at the present time, pass for a poor cellar wall, the masonry fulfilled its mission for many years, and withstood numerous heavy freshets.

This bridge was designed and erected by Timothy Palmer, of Newburyport, Mass., who was, without doubt, one of the leading bridge engineers of his time.

At the time of its removal it was the oldest wooden bridge in Pennsylvania, and the second oldest in the United States, being ranked by the structure built by Theo. Burr over the Hudson at Waterford in 1804.

The new structure is a through cantilever bridge of two shore and two river arms of 125 ft. each, and one suspended span of 50 ft., with a roadway of 32 ft. and two sidewalks of 12 ft. each.

The notable features of the design are such that under all conditions of loading the top chord of the shore arm is under tension, and the absence of all top lateral and sway bracing except at the main towers over the piers. The top chord is curved and is composed of eye bars throughout, thus giving the appearance of a suspension bridge.

The contract for the structure completed was awarded to the Union Bridge Co., who sublet the substructure to Messrs. J. W. Hoffman & Co. and the paving to the Barber Asphalt Paving Co.

PERSONAL.

—Mr. Walter J. Sherman, Chief Engineer of the Wheeling & Lake Erie, with headquarters at Toledo, O., has resigned.

—Mr. M. S. McCay, General Superintendent of the Mexico, Cuernavaca & Pacific, with headquarters at the City of Mexico, has resigned.

—Mr. Charles H. Webb, Car Accountant of the Lehigh Valley, with headquarters at South Bethlehem, Pa., has resigned, to take effect Nov. 1.

—Mr. W. B. Sterling, General Attorney for the Fremont, Elkhorn & Missouri Valley, with headquarters at Omaha, Neb., died at that place Oct. 15 from typhoid fever.

—Mr. John W. Hobart died at St. Albans, Vt., Oct. 17.

aged 68. Mr. Hobart was General Manager of the Central Vermont until 1891, when he retired from active railroad service.

—Mr. W. D. Lincoln, Car Accountant of the Oregon Short Line, with headquarters at Salt Lake City, Utah, has resigned. It is expected that Mr. Lincoln will be succeeded by Mr. G. L. Hickey, who is now Chief Clerk.

—Mr. William B. Storey, Jr., heretofore Chief Engineer and Acting General Superintendent of the San Francisco & San Joaquin Valley, has been elected General Superintendent of the same company. Mr. Storey has been in railroad service since 1877.

—Mr. W. J. Jeffrey, General Agent for the Denver & Rio Grande at St. Louis, and brother of Mr. E. T. Jeffrey, President of that road, died at his home in Chicago on Oct. 14. Mr. Jeffrey had been in railroad service for a number of years, having been connected with the Illinois Central before going to the Denver & Rio Grande. He had been ill for several weeks.

—Mr. E. E. Gerkins, Assistant-General Freight Agent of the Michigan Central, with headquarters at Bay City, Mich., died at his home in that city Oct. 10 from injuries received in a trolley car accident in Bay City last July. Mr. Gerkins had been connected with the Michigan Central for about five years. He entered the service of the company as a clerk in the office of the Commercial Agent in Toledo, being afterward appointed Commercial Agent at that place. He was appointed Assistant General Freight Agent about a year ago.

—Col. A. M. Tucker, General Agent of the Erie Railroad at Cleveland, resigned his position on Oct. 14 because of continued ill-health. He was born in Windsor County, Vermont, in 1836, and when 14 years old began work as a teamster on the Vermont Central, as it was then named. He next became a track laborer, and from that time rose steadily through various subordinate positions, ticket agent, freight clerk, etc., until he reached that of General Manager of the Erie lines west of Salamanca. On the reorganization of the Erie, 18 months ago, the grade of General Manager was abolished and Colonel Tucker's title was changed to General Agent. Not the least honorable part of Colonel Tucker's career was his service during the civil war. Here he was principally occupied in the superintendence of the government railroads. He enlisted as a private in August, 1862; was mustered out as Brevet-Colonel in December, 1865. His progress through his whole life has been normal, steady and sure. He attacked his work with great attention to detail and firmness of character and with strict honor. It is hoped that the absolute rest which Colonel Tucker can now have will restore his health.

—George Edward Mann, who for the past five years has been the Chief Engineer of the Grade Crossing Commission of Buffalo, died in that city on Saturday, Oct. 1. Mr. Mann was born in 1845 in the city where he died. His education was got in the schools of Buffalo and at Dartmouth College. Upon leaving college he went to Wisconsin and afterward to California, and returned to Buffalo in 1869. The next year he was appointed Assistant City Engineer, and subsequently Deputy City Engineer, which position he held until the spring of 1872. Following this he went as Assistant Engineer to the Buffalo & Southwestern, a railroad then building. There he was placed in charge of one of the divisions, which he managed for two years. Having been elected City Engineer of Buffalo in the fall of 1873, he assumed the office in January, 1874, and continued in it for two terms, or until January, 1878. During this time he took the preliminary steps toward establishing the present sewerage and drainage systems of the city by making a contour map to serve as a basis for the work. At the expiration of his term as City Engineer in January, 1878, he was made Deputy City Engineer, in which capacity he continued for the next two years. Then he began what proved to be a successful private practice, both in Buffalo and the oil regions of Pennsylvania. This he continued until January, 1888, when he again assumed the office of City Engineer of Buffalo, which he occupied for another two terms, covering the period to January, 1893.

Previous to the hearing before the Railroad Commissioners of New York, in 1887, on the subject of the abolition of grade crossings in Buffalo, Mr. Mann had been engaged by some of the city's interests to consider the matter. From the time when he first undertook this work, until his death, he was a prominent factor in the undertaking, serving for the last five years as Chief Engineer of the Buffalo Grade Crossing Commission. It is in connection with this work that he will be more particularly remembered. He was a man full of ideas, resourceful and ingenious, and combined many qualities which were valuable to himself and to the city in whose services so much of his life was spent.

—Mr. George M. Pullman died at his home in Chicago on the morning of Tuesday of this week. His death was from heart disease and very sudden. No serious warning had been received. Mr. Pullman was born in Brocton, N. Y., March 3, 1831. Although he was in his sixty-seventh year, no one would have supposed so, his figure and carriage being erect and vigorous, and his mental processes being very fresh and alert.

Mr. Pullman's fame rests on the introduction into railroad service, universally in the United States and to some degree in other parts of the world, of the luxurious cars which bear his name, and in this business he built up a great fortune. There is a popular notion that he was an inventor of considerable fertility and merit. This, we judge, is not correct. His great strength lay in the fact that he had imagination enough to see something of the possibilities of a class of cars which should give people comfort, not to say luxury, by day and night, and that he had the courage, persistence and business ability to push forward the introduction and use of those cars. The Pullman car as it stands to day is mechanically the composite result of the labors of many men, and mechanically it has served as a model and an object lesson for many others. The Pullman construction has undoubtedly affected railroad car building very favorably on the whole. There are some particulars, however, in which the ideas worked out in these cars have been decidedly bad; that is, Mr. Pullman has been responsible for a great deal of misapplied money and labor in car decoration and for years he did much to pervert the public taste. But the sum of his work has been so good that we are not disposed to find fault with the errors that he was responsible for.

Mr. Pullman had become an important person in the business world. He and his associates controlled great sums of money, were able to give credits to railroads or to help them in making loans, and thus he had become important in railroad matters aside from the direct influence of the Pullman Palace car business. We should not suppose, however, that his death would make very much difference in the conduct of the affairs of the company or in the financial relations of the properties with which he was directly or indirectly connected.

ELECTIONS AND APPOINTMENTS.

Atchison, Topeka & Santa Fe.—John P. Jones, heretofore Station Agent at Galveston, has been appointed Commercial Agent of the company, with headquarters in the same place.

Boston & Maine.—At the annual meeting of stockholders, held at Lawrence, Mass., Oct. 13, the present Board of Directors was re-elected with the exception of William T. Hart. At a subsequent meeting of the directors Lucius Tuttle was re-elected President.

Boston & Providence.—At the annual meeting of stockholders, held at Boston Oct. 13, the present Board of Directors was re-elected with the exception that John C. Gray was chosen to succeed Judge Lowell, deceased.

Chicago & Northwestern.—Henry A. Gross, heretofore General Eastern Passenger Agent, with headquarters in New York City, has been appointed General Eastern Agent in charge of the freight and passenger interests of the company in the East, with headquarters at New York. The appointment will take effect Nov. 1.

Cincinnati, Hamilton & Dayton.—A. J. Ball has been appointed Assistant Superintendent of Motive Power and Machinery, with headquarters at Cincinnati, O. The appointment took effect Oct. 14.

Concord & Montreal.—At the annual meeting of stockholders, held at Concord, N. H., Oct. 12, the following Directors were elected: Frederick Smyth, Benjamin A. Kimball, John H. Pearson, Walter M. Parker A. J. Pillsbury, Charles E. Tilton, Samuel S. Kimball, Charles E. Morrison, Lewis C. Patte, Frank Jones, N. S. Clark and Hiram N. Turner. At a subsequent meeting of the Directors Benjamin A. Kimball was elected President and F. S. Streeter, Clerk.

Cumberland & Pennsylvania.—At a stockholders' meeting, held at Cumberland, Md., Oct. 11, the following Board of Directors was elected for the ensuing year: Charles K. Lord, William F. Frick, James Sloan, Jr., William P. Harvey, and William H. Blackford.

Detroit, Toledo & Milwaukee.—F. E. Franks has been appointed Assistant General Passenger Agent, to succeed A. J. Richter, resigned.

El Paso & White Oaks.—J. L. Campbell, of El Paso, Tex., has been appointed Chief Engineer.

Gainesville & Gulf.—J. F. Bunch has been appointed General Freight and Passenger Agent, with headquarters at Gainesville, Fla., to succeed H. E. Day, resigned.

Great Northern.—J. W. Donovan, heretofore Trainmaster of the Montana Central, with headquarters at Great Falls, Mont., has been appointed Superintendent of the Cascade Division of this road, with headquarters at Leavenworth, Wash., to succeed V. A. Riton, resigned.

Jamestown & Lake Erie.—Gerald Redmond, of New York, has been elected Vice-President, with office at Jamestown, N. Y., to succeed E. T. Haines, resigned. The office of President, left vacant by the resignation of H. W. Martin, has not yet been filled. C. R. Van Etten, heretofore Auditor, has been elected General Manager, with office at Jamestown. A. G. Barnett has been appointed Auditor to succeed Mr. Van Etten and John G. Moynihan has been appointed General Passenger Agent, both with office at Jamestown.

Kennebec & Franklin.—The officers of this road, referred to in another column, are as follows: President, P. O. Vickery; Treasurer, M. V. Chase; Secretary, H. M. Heath, all of Augusta, Me.; Chief Engineer, Parker Spofford, Bucksport, Me.

Lake Superior, Terminal & Transfer.—At the annual meeting of stockholders, held Oct. 9, at St. Paul, the following officers were elected: President, J. W. Kendrick; Vice-President, James N. Hill; Secretary, F. J. Shepard.

Litchfield, Carrollton & Western.—T. W. Geer, Trainmaster, having resigned, that office has been abolished and hereafter matters pertaining to that department should be addressed to C. B. McCall, General Manager, Carlinville, Ill.

Mexico, Cuernavaca & Pacific.—M. S. McCay having resigned as General Superintendent, that office has been abolished. R. E. Comfort has been appointed Assistant Manager, with headquarters at the City of Mexico, in charge of transportation and maintenance of way.

Michoacan & Pacific.—W. H. Rice has been appointed Master Mechanic, with headquarters at Zitacuaro, Mex., in charge of the motive power department, to succeed H. A. O'Brien. The appointment took effect Oct. 8.

Montana Central.—Frank Shesgreen, heretofore Chief Clerk in the office of the Assistant General Superintendent of the Great Northern, at St. Paul, has been appointed Trainmaster of this road, with headquarters at Great Falls, Mont., to succeed J. W. Donovan.

Montreal & Western.—The following Board of Directors has recently been elected: T. G. Shaughnessy, President; J. D. Rolland, Vice-President; Adolphe Chapleau, Judge Clark, R. B. Angus, L. G. Ogden, W. S. Taylor and Charles Drinkwater.

Northern Pacific.—As the company wishes to concentrate its offices at St. Paul, Charles F. Coaney, of New York, has resigned as Secretary, and George H. Earl, of New York, as Treasurer. C. A. Clark, formerly Assistant Treasurer, has been elected Treasurer, with headquarters at St. Paul, and Mr. Earl has been made Secretary and Assistant Treasurer in New York. The Board of Directors passed a resolution expressing its acknowledgement of the "faithful, efficient and zealous discharge of duty by Mr. Coaney." George W. McCaskey, District Passenger Agent, at Butte, Mont., has been transferred to Toronto, Ont.

Peoria, Decatur & Evansville.—At a recent meeting of the Directors the following officers were elected: President, Robert S. Anderson; Vice-President, John H. Prall; Secretary, W. J. Lewis.

Piedmont & Cumberland.—At the annual meeting of stockholders, held at Baltimore, Md., Oct. 12, the following directors were elected for the ensuing year: Henry G. Davis, Stephen B. Elkins, R. D. Barclay, G. C. Wilkins, W. H. Gorman, W. J. Read and C. M. Hendley.

Poughkeepsie & Eastern.—At the annual meeting of stockholders, held in New York Oct. 14, the following directors were elected: Russell Sage, J. J. Slocum, J. P. Munn, J. B. Dutcher, E. C. Osborn, C. W. Osborn, L. H. Vail, G. H. Sherman and E. C. M. Rand. At a subsequent meeting of the directors the present officers were re-elected.

St. Louis & San Francisco.—A. O'Hara, heretofore Division Superintendent at Neodesha, Kan., has been transferred to Springfield, Mo., to succeed J. A. Mantor, resigned, as Superintendent of the Springfield Division. Carl A. Gray, heretofore Division Freight Agent at Wichita, Kan., has been appointed Division Superintendent at Neodesha, to succeed Mr. O'Hara. T. J. Franks, heretofore Traveling Freight Agent at Wichita, will succeed Mr. Gray as Division Freight Agent at that place.

St. Louis, Peoria & Northern.—J. J. Hughes has been appointed Roadmaster, with headquarters at Springfield, Ill.

St. Paul, Minneapolis & Manitoba.—At the annual meeting of stockholders, held at St. Paul, Minn., Oct. 16, the present Board of Directors was re-elected with the exception that John L. Kennedy, of New York, was chosen to succeed George Bliss, of that city, deceased.

San Francisco & San Joaquin Valley.—William B. Storey, Jr., heretofore Chief Engineer and Acting General Superintendent, with headquarters at San Francisco, has been elected General Superintendent.

South Atlantic & Ohio.—C. M. Leilich, Assistant Superintendent, and John King, Master Mechanic, having both resigned, E. M. Roberts has been appointed Assistant Superintendent and Master Mechanic, with headquarters at Bristol, Tenn.

Southern.—At the annual meeting of stockholders held at Richmond, Va., Oct. 19, the present Board of Directors was re elected with the exception that Messrs. Joseph Bryan, of Richmond, Va., and Robert M. Gallaway, of New York, were chosen to succeed Messrs. A. L. Boulware and G. W. Maslin. William A. Johnson has been appointed Traveling Passenger Agent, with headquarters at New York, under Eastern Passenger Agent A. S. Thweatt.

Uniontown, Waynesburg & West Virginia.—At a meeting of the projectors of this road, held Oct. 11, the following officers were re-elected: President, D. S. Walton, Waynesburg, Pa.; First Vice-President, B. C. Lauth; Second Vice-President, Samuel Harvey; Secretary, J. A. F. Randolph; Treasurer, J. B. F. Rinehart.

RAILROAD CONSTRUCTION, Incorporations, Surveys, Etc.

Arkansas & Choctaw.—Twelve miles of this new road from Arden, Tex., west to the state line are under construction and 20 miles more will be built in the spring. Thirty miles from Arden east to Ashdown, a point on the Kansas City, Pittsburgh & Gulf, are now being operated. The entire line as projected is to extend from Ashdown west to Atoka, I. T., about 150 miles. The maximum grades for the section now being built are 20 ft. to the mile, and the curves are very light. Money has been furnished to complete the road by the company itself, which is a part of the Central Coal & Coke Co., of Kansas City, Mo. The track is to be laid with 65-lb. rails. W. H. Carson, Texarkana, Tex., is Superintendent, and F. W. Valiant, Chief Engineer.

Atlantic & Lake Superior.—It is announced that this company is to begin at once to grade that portion of the Great Eastern Division of this road from Levis northeast to Yamaska, Que., about 94 miles. Of this seven miles from Nicolet to St. Gregoire are completed. The new line will be an active competitor of the newly completed Drummond County extension of the Intercolonial. The Atlantic & Lake Superior was incorporated in 1893 to acquire by building and purchase a line from St. Mary's River, Ont., to Gaspe Bay, Que. The building has been begun at several points along this line, and at the present time is being actively carried on at the eastern end from Calpin to Paspebiac, about 20 miles. About 100 miles of the entire line are now being operated.

Baltimore & Ohio.—The double tracking of 14 miles on the Pittsburgh division is to be completed as soon as the rails are delivered. On the work at Falls Cut, 22 miles west of Cumberland, Md., the grading is nearly done and the new tracks should be completed by Dec. 15.

Buffalo, Attica & Arcade.—This road, which extends from Attica, N. Y., to Arcade, 26 miles, proposes to extend its tracks about 1½ miles in Arcade to connect with the Western New York & Pennsylvania. S. S. Bullis, of Olean, N. Y., is President.

Buffalo, Rochester & Pittsburgh.—Surveys have been completed for an extension of this line from Punxsutawney, Pa., west through Butler, about 60 miles, to Newcastle; in all about 100 miles. It is stated that entrance is proposed to Pittsburgh over the lines of the Pittsburgh, Bessemer & Lake Erie, from Butler. Connection is to be made at Newcastle with the Ohio Midland and at Kittanning with the Allegheny Valley.

Canadian Pacific.—The grading on the first 16 miles of the Slocan Branch, which is to extend from Slocan on the Columbia & Kootenay Division, north 32 miles to Slocan Lake, has been finished by contractors J. G. McLean & Co., of Slocan City, Nelson, B. C. The second 16 miles, contracted for by Poepore, McVeigh & Co., of Nelson, are nearly complete.

Central of Pennsylvania.—Final surveys are being made for the extension of this road from Lamar, Pa., east 35 miles to White Deer, on the Perkomen Division of the Philadelphia & Reading, and to Watsontown, a point on the Pennsylvania. The line now runs from Bellefonte, Pa., northeast 27.3 miles to Millhall, and was completed last year. Walter M. Ross, 304 Walnut street, Philadelphia, is President.

Cheat River.—About seven miles of this road from Rowlesburg, W. Va., have been completed, and trains are now running. The road, as projected, is to extend from Point Marion, Pa., a point on the Baltimore & Ohio, southeast up the Cheat River 73 miles to Carson's, W. Va., a point on the West Virginia & Pittsburgh. About 30 miles more of the road will be built as soon as weather permits.

Chesapeake & Ohio.—The seven miles of second track from Huntington to Kenova, W. Va., has been completed and is now in operation.

Chesapeake Beach.—The Chesapeake Bay Construction Co., Washington, D. C., which has the contract for building this road, has sublet the contract for grading to Messrs. Green & Burrows, Atlantic Building, Washington, and for crossties to Messrs. Homes & Elkins, of Washington. The road as incorporated is to extend from Washington east about 30 miles to Chesapeake Beach.

Chicago, Indianapolis & Louisville.—At the beginning of this season this company had on the 66 miles between the Indiana State Line and Monon, Ind., 26 miles of 60-lb. rail. This has been replaced by 75-lb. rail. At Cedar Lake, Ind., 40 miles from Chicago, at Lowell, 45 miles, and at Rensselaer, 73 miles from Chicago, there were sharp curves, varying from 5 to 6½ deg., and grades varying from 40 to 65 ft. per mile. At Cedar Lake the

alignment and grades are being changed, so that where there are now eight curves, the maximum being 6 deg., there will be only three curves, the maximum being 3 deg. The grade will be changed from a varying grade, with an extreme of 65 ft. per mile, to a uniform grade of 26 ft. per mile. This work will be completed this month.

At Lowell there were, in a distance of three-fourths of a mile, four curves of 6 deg. 15 minutes each, on a grade with an extreme of 46 ft. per mile. These curves have been reduced to one of 2 deg. and 30 minutes, and the grade reduced to 25 ft. per mile. At Rensselaer a curve of 6 deg. has been reduced to 3 deg. and 30 minutes. A hill two miles in length, with grades varying from 30 to 65 ft., has been changed to one uniform grade of 26 ft. per mile.

Chicago, St. Louis & Texas Air Line.—Final surveys have been completed for the portion of this line from Brownsville, Tex., north about 270 miles to San Antonio, and it is expected that building will begin at an early date. The character of the work will be very light and only a small amount of bridge work will be required. The promoters are negotiating with contractors for the work of this division and state that the necessary money will be forthcoming as soon as the right of way and depot grounds are fully secured. The people of Brownsville offer $150,000 for the first railroad entering that city with a northern connection with any of the leading roads of the state. The company has submitted a proposition to the people of San Antonio that they subscribe $150,000 and give land for the right of way and terminal facilities. The entire line as projected is to extend from Brownsville through San Antonio, Breckinridge and Henrietta, Tex., north about 800 miles to Coffeyville, Kan. Dr. D. Griffin Gunn is President and J. M. Nix is General Manager, with headquarters at San Antonio, Tex.

Colorado Valley.—Contracts have been let and work has been begun on this road from Sweetwater, Tex., to a connection with the Gulf, Colorado & Santa Fe, about 75 miles south. The company has contracts yet to let for grading and other work. Irving W. Wheatcroft, of Sweetwater, Tex., is the Vice-President and General Manager.

Duluth & Iron Range.—Contracts have been let to the Drake-Stratton Co., Pittsburgh, Pa., for building 18 miles of line of new track from Waldo to Colquet River, Minn., to replace the old road. The maximum grade of the new line will be 1½ per cent. About 3,500,000 yds. of earth are to be moved under the contract.

Evansville & Richmond.—It is reported that work has been begun again to put this road in condition for operation and that nearly $30,000 worth of material have been purchased recently to begin repairs. Operations were entirely suspended in March on account of heavy floods, and the road has not since been operated. It extends from Elnora, Ind., to Westport, 101 miles. W. C. Barwell, Evansville, Ind., is Receiver.

Great Northern.—President Hill has announced the intention of his company to build a connection between the Fosston Branch from Fosston, Minn., east to Duluth, connection being made with the Duluth, Missabe & Northern for Duluth at Colquet. The new line will be about 200 miles long and it is stated that work is to begin immediately.

According to report a cont ract has been let to A. Guthrie, of St. Paul, Minn., for grading a branch from Nemadji bridge near Dedham, Wis., northwest toward Carlton, Minn.

Gulf & Chicago.—This company proposes to make an extension from Pontontoc, Miss., south through Hoolca to Houston, Miss., about 25 miles. No surveys have yet been made, and nothing will be done toward financing the new road until quarantine restrictions are removed from the state. The present road runs from Middletown, Tenn., south to Pontontoc, Miss., 62.5 miles. J. W. T. Falkner, Oxford, Miss., is President and General Attorney.

Intercolonial.—The new Drummond County extension of the Intercolonial is to be opened Oct. 22. It is expected that regular train service will begin between Montreal and Quebec about Nov. 1.

Jasper, Troupsburg & Knoxville.—This company was incorporated in New York Oct. 19 with a capital of $110,000 to build a line from Jasper, Steuben County, south about seven miles through Troupsburg to the Pennsylvania line near Austinburg, Pa. This road is to be operated in connection with the Knovville, Troupsburg & Jasper, incorporated Sept. 25 in Pennsylvania, making a connection with Knoxville, Pa., in all about 12 miles. The directors of the New York company are: D. C. Hunter, A. M. Murphy and D. F. Countryman, of Jasper; W. N. Griggs, Henry Simpson, L. H. Everett and William Hooper, of Troupsburg, and B. Van Steenbergh, 53 Broadway, New York.

Kennebec & Franklin.—Preliminary surveys have been completed for this road, which is to run from Augusta, Me., northwest through Manchester, Winthrop and Readfield to Mt. Vernon, to connect with another line which has been surveyed from that point to Farmington, the whole distance being about 45 miles. The names of the officers are given in another column.

Little Kanawha Valley.—Twenty miles of grading have been completed from Parkersburgh, W. Va., and track is laid and ballasted for seven miles to Claysville. Rail and fastenings are ready for resuming track-laying Oct. 5 on the portion graded. Heavy rock cutting at Leachtown, 14 miles from Parkersburgh, is nearly completed and rapid progress has been made to all points. It is expected that train service will be had to Palestine, 30 miles, early in 1898. Thomas Pettegrew, Parkersburgh, is Chief Engineer and C. L. Williams, Superintendent.

Lumberton & Marion.—Surveys have been begun for this road to extend from Lumberton, N. C., southwast abuto 50 miles through Robeson County, S. C., and Marion County, S. C., to Marion, S. C. Both points are on the Seaboard Air Line, which, it is understood, is financially interested in the new line. A large sum of money has been obtained from the two counties and from private citizens.

Mahoning Valley Belt Line.—Under this title prominent citizens of Pittsburgh, Pa., are projecting an elaborate belt line and terminal railroad at Pittsburgh. The plan includes the proposed West Side Belt Line (see this column for July 16), the Little Sawmill Run Railroad and the proposed Pittsburgh & Northwestern, all to be incorporated under the above name. The line will cross the roads now running into the city and furnish terminal facilities for the Wabash, the Pittsburgh, Bessemer & Lake Erie, the Buffalo, Rochester & Pittsburgh and other lines seeking admission. Among those interested are said to be J. Dawson Callery, President of the United Traction Co., Pittsburgh, and John C. Sheehan, New York.

Montgomery, Hayneville & Camden.—Eleven miles of this road from Camden, Ala., have been graded. The proposed road is to extend from Montgomery southwest to Camden, 75 miles; and it is proposed later to extend it to some point on the Gulf of Mexico. The 75 miles under construction have been bonded for $937,500, the bonds being five per cent. gold. The company has received subscriptions amounting to about $50,000 payable when the road is built. S. D. Bloch, of Montgomery, Ala., is President.

Newfoundland Road.—Press reports state that the Government railroad has been completed across the island of Newfoundland. This is known as the Northern & Western Government Railway and runs from St. Johns east, about 500 miles, across Exploits River to Port-aux Basques. From this port a line of steamers will carry mails and passengers in a tri-weekly service to Sydney, N. S., where connection is made with the Intercolonial.

New Roads.—A company is being organized, with $50,000 capital, in Louisiana, to build a road from Franklin, La., northwest about 35 miles through the parishes of St. Mary's, Iberia and Vermillion to Abbeville. The main office is at New Orleans. The officers are: President, Donnelson Caffery; Secretary, Matthew Bell; Treasurer, Charles Rice.

Omaha, Kansas City & Eastern.—The preliminary survey for an extension from Pattonsburg, Mo., southwest about 75 miles, to St. Joseph, has been completed. (See this column for Sept. 3.) The company does not contemplate building immediately.

Pennsylvania Co.—The Beaver Dam Valley Branch of the Cleveland & Pittsburgh Division, from New Philadelphia, O., east five miles, up the Beaver Dam Valley, to the mines of the East Goshen Coal Co., has been completed and is in operation. The work was begun May 10.

Portland & Rumford Falls.—Contracts have been let and most of the grading completed for the extension of the Otis Falls branch from Canton, Me., through Jay and East Livermore to Chisholm's Mills, 10 miles. The contractors are: McGregor Bros., on grading; Fred Roy, on culverts; Mairs & Lewis, of New York, for masonry, and Phœnix Bridge Co., of Phœnixville, Pa., for the the bridges. The grading, tracklaying, masonry and bridge building are all completed and nothing remains except a little ballasting. The maximum grade is 52.8 ft. per mile, and the maximum curve 14 deg. There is one steel bridge 690 ft. in length, made in three equal spans. Hugh J. Chisholm, Portland, Me., is President, and R. B. Stratton, Rumford Falls, is Engineer.

Southern.—A. B. Andrews, Raleigh, N. C., First Vice-President, has closed a contract with a firm of contractors at Winston, N. C., for grading the extension of the North Carolina Midland Division from Mocksville, N. C., northwest about 35 miles, to Mooresville, on the Charlotte & Taylorsville Division.

Toluca & Eastern.—This company has been incorporated in Illinois with a capital stock of $50,000 to build a road from Rutland, Ill., a point on the Illinois Central, west about five miles to Toluca, on the Atchison, Topeka & Santa Fe. The principal office is at Toluca. The incorporators are: Henry Duggan, William W. Twist, James E. Potterfield, Toluca, Ill.; Henry J. Miller, Charles J. Devlin, Spring Valley, Ill.; and Joseph S. Wylie, Davenport, Ia., who, with Edward Anderson, of Marquette, Albert G. Daumling, and Newton F. Phillips, of Chicago, constitute the first board of directors. It is stated that the work of building will begin in a few days, and that the line will be in operation by Dec. 1.

Vancouver, Victoria & Eastern.—Negotiations have been concluded by William Mackenzie and D. D. Mann, of Vancouver, B. C., for the acquirement of this road. The road was projected by McLean Bros., of Vancouver, several months ago to run from Vancouver, B. C., east through Boundary Creek and Rossland into the interior, about 325 miles. Preliminary surveys were made last year by J. H. Brownlee, of Vancouver. The British Columbia government has voted $4,000 per mile subsidy for any company building on this route.

Wabash.—The company has purchased during the present year 20,000 tons, about 142 miles, of 80-lb. rails, about 45 miles of which has already been laid in track to date, and the remainder is expected to be delivered within the next month or so. The company expects to lay 65 miles of this rail on the main lines between Toledo and Danville, Ill., 67 miles between Chicago and St. Louis and the remainder between St. Louis and Kansas City. This will make a total of over 300 miles of 80-lb. rails laid since May, 1896. The 80-lb. rail has been adopted as the standard weight rail for use on the main lines.

Washington & Rockville.—This company has been incorporated in Maryland to build a road from the northern boundary of the District of Columbia northwest to Bethesda Park in Montgomery County, Maryland. The incorporators are: Oscar T. Crosby, Julian Hite Miller, of Washington, D. C.; Henry Maurice Talbott, William H. Talbott, Albert J. Almoney, Montgomery County, Maryland.

Wiscasset & Quebec.—The preliminary survey has been completed for the extension of this road from Albion, north about 15 miles to Burnham, Me. The present road extends from Albion south 40 miles to Wiscasset, a point on the Maine Central. W. F. P. Fogg, Wiscasset, Me., is General Manager.

Electric Railroad Construction.

Ambler, Pa.—A public meeting was held Oct. 15 in the interest of building a trolley line from Ambler to Plymouth Meeting. At the latter place it is proposed to connect with the lines of the Chestnut Hill & Norristown electric road. The distance between the two points is about five miles. The company will probably be incorporated under the name of the Ambler & Plymouth Trolley Railway Co. Various committees were appointed and another meeting will be held soon. The estimated cost of the road is $50,000.

Asheville, N. C.—The Asheville Electric Power & Light Co. was organized at Asheville on Oct. 9, with Dr. J. H. McAden, of Charlotte, N. C., as President, and James H. Cutlar, of Boston, Mass., Secretary and Treasurer. The capital stock was placed at $200,000, with power to increase this amount if desired. The new company will take the property of the West Asheville Electric & Improvement Co. and extend the electric railroad tracks formerly operated by that company and also supply the city of Asheville with power for the electric lighting.

Baltimore, O.—The Baltimore, Halethorpe & St. Denis Electric Railway Co. has been incorporated with a capital of $100,000, to build a line five miles long from Frederic road and Canton avenue to Elkridge Landing. The incorporators are Isaac H. Francis, Carville D. Benson and others.

Bethlehem, Pa.—A petition is being circulated asking town council to allow the Easton, Palmer & Bethlehem electric road to enter Bethlehem by the New street route, which was asked for by the company.

Boston, Mass.—The West End Street Railway of this city will extend its lines to Brookline, Mass.

Brantford, Ont.—An electric railroad will be built from this city to Paris, a distance of 7 miles.

Bridgeport, Conn.—The Bridgeport Traction Co. will ask the Superior Court to determine the public necessity and convenience on the proposed extension from Southport to Westport. The projected line closely parallels the tracks of the New York, New Haven & Hartford.

Canon City, Col.—The Canon City & Cripple Creek Electric Railroad Co. has contracted with Orman & Crook, of Pueblo, to build a road 30 miles long from here to Cripple Creek. The road is to be completed by March 20, 1898, and will cost about $1,000,000. A power-house will be built on the Arkansas River to furnish power for the road and also for the mines in the Cripple Creek district. The officers are Lyman Robison, President; J. H. Peabody, Treasurer; F. A. Reynolds, Secretary.

Chicago.—The Northside Electric Railway Co. of Chicago has secured right of way for a new electric line, seven miles in length, through Dearborn and other streets. The company will petition council for a franchise.

Cleveland, O.—The Cleveland, Medina & Southern Electric Railway Co was incorporated on Oct. 7 with a capital of $750,000. The company proposes to build an electric road from Cleveland to Cincinnati, passing through Columbus. The incorporators are F. C. Goodman, Joseph W. Roof, W. P. Hockney, A. R. Gilson, George R. McKay, Francis C. McMillin and Joseph H. Storer.

Dayton, O.—The Dayton & Troy Traction Co. has been incorporated with a capital of $50,000, to build a road between here and Troy. The incorporators are Frank M. Turner, C. C. Wise A. G. Feight and others.

Doylestown, Pa.—Work of grading the Willow Grove electric line to Doylestown is well under way. The contractors expect to be able to complete the track construction between Doylestown and Willow Grove by the middle of next month.

Exeter, N. H.—The Exeter Street Railway will build a loop line three miles long this fall.

Hanover, Mass.—It is said that the Hanover Street Railway will extend its line from Assinippi to Norwell Center, and will probably do the work this autumn.

Highland Park, Mich.—The Oakland Railway has asked the Highland Park Council for a franchise over the half mile of Woodward avenue that runs north through the village from the point where the Woodward avenue cars turn off to Palmer Park. The township of Greenfield will also be asked to grant a franchise on the same avenue.

Kenosha, Wis.—The Milwaukee, Racine & Kenosha Electric Street Railway Co. has filed with the council another application for a franchise and right of way through the city. The two former applications were rejected by the city because it was unwilling to grant a franchise for 50 years, which was the term asked for. The ordinance now asked for is virtually the same as those rejected, with a few minor concessions to the city which were contended for by the council. The road is now built to the north limits of the city, and the completed portion will be in operation within a few weeks.

McKeesport, Pa.—John George, of Irwin, Pa., has secured a charter for an electric railroad to be constructed from Irwin to McKeesport.

Milford, Conn.—It is stated that the Milford Street Railway Co. has secured its right of way and will soon let the contracts to build its circuitous line, connecting at the Housatonic bridge with the lines of the Bridgeport Traction Co. and running through Milford to Woodmont. As proposed, it will be a connecting link between New Haven and Bridgeport.

Milton, Pa.—The Lewisburg, Milton & Watsontown Electric Railroad Co. is building a line nine miles long, connecting the three towns named in the company's title. The company has bought the electric light plant at Milton and will enlarge the power-house so as to make room for a new 400-H. P. Corliss engine and boilers. The new engine will be put in place next month, and it is expected that the nine miles of road will be in operation by Christmas. J. W. Cramp is Superintendent and General Manager.

Montoursville, Pa.—Next spring the Montoursville Electric Railway is to be extended to Hughesville and Muncy.

New Rochelle, N. Y.—The New Rochelle Electric Railway Co. has elected John H. Starin, President; Charles Nutt, Secretary, and William T. Emmett, Treasurer. The company has begun to secure the consent of property-owners along the seven miles of the way.

New York.—At the hearing of the Supreme Court Special Commission on rapid transit last week, Mr. W. B. Potter, Chief Engineer of the General Electric Co., stated that the General Electric Company would equip the rapid transit underground road complete for $7,845,000. This includes power station, rolling stock and lighting.

Northampton, Mass.—The Northampton & Amherst Electric Railway Co. has been formed with a capital of $150,000, one-half paid up. It proposes to build a road seven miles long between the towns named in its title.

Pelham, N. Y.—The Pelham Electric Railway Co. has elected Jacob Heiser, President; John H. Young, Treasurer, and Frank M. Lyon, Secretary.

Red Bank, N. J.—The Atlantic Highlands, Red Bank & Long Branch electric road is to be extended to Fair Haven, a distance of 3½ miles.

Santa Rosa, Cal.—It is said that the Santa Rosa & Sonoma County Electric Railway Co. has finished the survey of 15 miles for a road in Sonoma County, but will do no more work until $400,000 bonds have been sold. The company intends to build 70 miles of narrow-gage road from Embercardero to Calistoga at a cost of $10,000 a mile.

Shenandoah, Pa.—The Shenandoah Street Railway Co. has been granted a charter with a capital of $100,000 to build an electric railroad six miles long. The President is Hamilton Godfrey, of Reading, and the Directors, J. W. Johnson, Shenandoah; H. D. Richardson, Ringtown, John H. Rothermel and H. C. Gupler, Reading.

Warren, Mass.—An electric road is to be built from Warren to Wales. The new company has been granted franchises by the authorities of Wales, Warren and Brimfield.

Youngstown, O.—A company will be organized with a capital of $75,000 to build an electric railroad from this place to Struthers in the spring. Right of way has been obtained.

GENERAL RAILROAD NEWS.

Alabama & Vicksburg.—Sealed proposals are asked for the sale to this line, which forms a part of the Queen & Crescent system, of $20,000 of its second mortgage bonds, with all unpaid coupons attached. They will be received at the office of the company, 833 Gravier street, New Orleans, La. This offer is according to the conditions under which the mortgage bonds were issued.

Baltimore & Ohio Southwestern.—The earnings for August and for the two months ended Aug. 31 were reported as follows:

August:	1897.	1896.	Inc.
Gross earn.	$590,662	$540,952	$49,710
Oper. expen.	390,571	362,490	28,081
Net earn.	$200,091	$178,462	$21,629
Two months:			
Gross earn.	$1,126,654	$1,032,090	$94,564
Oper. expen.	783,871	725,332	58,539
Net earn	$342,783	$306,758	$36,025

Chicago Great Western.—The earnings for September and for the three months ended Sept. 30 were reported as follows:

September:	1897.	1896.	Inc.
Miles	928	928	
Gross earn.	$524,145	$438,181	$85,964
Oper. expen.	337,150	296,190	40,960
Net earn.	$186,995	$141,991	$45,004
Three months:			
Gross earn.	$1,395,344	$1,187,102	$208,242
Oper expen.	915,703	855,210	60,493
Net earn	$479,641	$331,892	$147,749

Illinois Central.—This company has filed at Frankfort, Ky., a 99-year lease of the Chesapeake, Ohio & Southwestern. The controlling interest in this road was acquired by the Illinois Central in December, 1893, and on Aug. 1, 1896, the second mortgage was foreclosed and the road taken possession of under a new incorporation by the Illinois Central. The road extends from Louisville, Ky., southwest 390.6 miles to Natchez.

Kansas City, Watkins & Gulf.—The Bondholders' Committee recently appointed (see this column for Aug. 27), after a conference with many large holders, advises the immediate deposit of the bonds with the Metropolitan Trust Co., of New York. The preliminary agreement will provide that bonds may be withdrawn by any depositor to whom the final plan shall be unacceptable. The limit of the deposit is placed at Dec. 1, and after that date right is reserved to decline further deposits. The final plan will be given when a sufficient proportion of the notes and bonds have been deposited.

Mexican National.—The earnings for August and for the eight months ended Aug. 31 were reported as follows:

August:	1897.	1896.	Inc. or Dec.
Gross earn.	$509,136	$438,789	I. $61,347
Oper. expen.	380,794	315,960	I. 64,834
Net earn.	$119,342	$122,829	D. $3,487
Eight months:			
Gross earn.	$3,988,686	$3,259,190	I. $729,496
Oper. expen.	2,994,542	2,440,469	I. 554,073
Net earn.	$994,144	$818,721	I. $175,423

Millen & Southern.—This road was sold at foreclosure sale to C. D. Baldwin, Oct. 6, for the upset price of $30,000. The road extends from Millen, Ga., a point on the Central of Georgia, to Stillmore, 36 miles. It was chartered March 26, 1890, as successor to the Rogers & Summit.

New York, New Haven & Hartford.—It is stated that this company has acquired the last of the outstanding shares of the Shepaug, Litchfield & Northern, a road which extends from Litchfield, Conn., to Hawleyville, 32.3 miles. The company to be absorbed has a capital stock of $600,000, the bulk of which was acquired by the New York, New Haven & Hartford with the old Housatonic several years ago.

Oregon Short Line.—The earnings for August and for the two months ended Aug. 31 were reported as follows:

August:	1897.	1896.	Inc. or Dec.
Gross earn.	$501,414	$477,848	I. $23,566
Oper. expen.	325,878	373,990	D. 48,112
Surplus.	$175,536	$103,858	I. $71,678
Two Months:			
Gross earn.	$1,060,756	$966,985	I. $93,7713
Oper. expen.	630,595	724,484	D. 93,88
Surplus	$430,161	$242,501	I. $187,660

Pittsburgh, Cincinnati, Chicago & St. Louis.—The earnings for September and for the nine months ended Sept. 30 were reported as follows:

September:	1897.	1896.	Inc. or Dec.
Gross earn.	$1,352,677	$1,176,787	I. $175,890
Oper. expen.	791,430	742,502	I. 48,928
Net earn.	$561,247	$434,285	I. $126,962
Charges	215,150	241,239	D. 26,089
Balance	$346,097	$193,046	I. $153,051
Nine months:			
Gross earn.	$10,736,021	$10,875,619	D. $139,598
Oper. expen.	7,411,379	7,960,653	D. 549,274
Net earn.	$3,324 643	$2,914.966	I. $409,676
Charges	2,297,390	2,403,411	D. 106.021
Balance	$1,027,252	$511,555	I. $515,697

Peoria, Decatur & Evansville.—Holders of first mortgage and second mortgage bonds, New York Security & Trust Co.'s certificates of deposit of second mortgage bonds, and holders of stock are notified that these securities should be deposited with the Central Trust Co. of New York on or before Nov. 1, and that the first installment of five per cent. on the second mortgage bonds and one per cent. on the stock is payable on the deposit of these securities. This notice is in accordance with the plan of reorganization given in this column Oct. 1. At a meeting of first mortgage Atlantic Trust Company certificate holders in New York, Oct. 11, the plan of reorganization submitted by the first mortgage Bondholders' Committee was unanimouslyadopted.

Richmond, Nicholasville, Irvine & Beattyville.—This railroad was sold under foreclosure at Versailles, Ky., Oct. 11, by Special Commissioner George Du Relle to Messrs. Shanahan, Walker & Hauger representing a mechanics' liens, for about $460,000. Two other attempts have been made to sell the roed, and the upset price had been recently reduced from $250,000 to $160,000. (See this column for Oct. 1.) The road runs from Versailles, Ky., to Irvine, 61 miles.

St. Louis, Chicago & St. Paul.—Stockholders meet at Springfield. Ill., Oct. 30, to authorize the first mortgage for $1,500,000 and the second mortgage for $1.235,000. The road was sold at Springfield April 3 under foreclosure and was reincorporated in Illinois, May 14. This proposition for new mortgages is under the reorganization plan.

Southern Pacific.—The United States Supreme Court Oct. 18 decided adversely in the case of the claims of this road for about 700,000 acres of land in Southern California. The land was declared by Congress some time ago to be forfeited by the Atlantic & Pacific. Thereupon the Southern Pacific laid claim to it as being a part of the land granted to that company by Congress. The Lower Court in a recent decision decided against the claim and that decision has been sustained by the Supreme Court.

Union Pacific.—W. D. Cornish, special master appointed to take testimony in the suit of J. Pierpont Morgan and others, trustees, against this company, has made a report which was confirmed Oct. 15 by Judge Lacombe, of the United States Circuit Court at New York. The report orders that the Union Pacific company, within five days after the entry of the decree, pay for the benefit of holders of collateral notes, $3,183,000 with interest from Aug. 1, 1897, and that in default of such payment bonds and other securities held by the trustees are to be sold at auction at the New York Real Estate Exchange. These collateral notes to the amount of $18,710,000 were issued, payable on Aug. 4, 1894, with interest at six per cent. and of these $15,527,000 have been redeemed.

Electric Railroad News.

Chicago, Ill.—As stated in these columns last week, The Englewood & Chicago Electric Street Railway was sold at auction Oct. 12, the amount bid by the Reorganization Committee of the bondholders being $260,000. The members of this committee are Alfred S. Heidelback, S. R. Shipley, Jules. S. Bache and Isaac L. Rice, all of New York. This is the road which has been using storage batteries, mention of which has from time to time been made in the *Railroad Gazette*. The cost of the property, including franchises and frontage petitions, has amounted approximately to $1,000,000, and there is outstanding about $900,000 in bonds and $225,000 in Receiver's certificates. The property includes nearly 35 miles of right of way, and 26 miles of track already finished, 21 miles of which is double track; the power-house is one of the most complete so far built and was designed especially for the use of storage batteries. There are 23 motor cars, 16 open and 20 closed cars. Since the road went into the hands of a Receiver in January last the average number of passengers carried daily has been about 4,000; the Sunday business during the summer averaged about 15,000 passengers. The Reorganization Committee will meet in a few days to elect officers. It expects to operate the road and build immediately extensions to Pullman and Harvey.

Columbus, O.—The Columbus Street Railway and the Columbus Central Railway have virtually agreed to consolidate, a conference looking to that arrangement having been arranged. The former company has been negotiating for some time for the purchase of the Central. The Columbus proposes to call in its old and issue preferred stock, and the Central stock will be retired. It is understood that the Columbus is to pay $3,000,000 for the Central property and assume the latter's indebtedness.

Jersey City, N. J.—The North Hudson County Railway Co. has decided to remove the shed extending from Ferry street to Ravine avenue in front of the Palisade avenue power-house, leaving the space from the power-house to Palisade avenue bare.

Madison, Wis.—The Madison Street Railway will be sold under foreclosure proceedings on Dec. 1 on an order granted on petition of the New York Guaranty & Indemnity Co., which holds bonds amounting with interest to $174,412. The road has been in the hands of a receiver a year and a half.

Milwaukee, Wis.—Authority has been given to the Board of Directors of the Waukesha Beach line to sell the franchise of the road to the Milwaukee Electric Railway & Light Co. The offer made by the Milwaukee Company was $65,000, $50,000 in bonds and the balance in cash.

New York.—The State Railroad Commissioners have denied the application of the Commissioner of Public Works of this city and the citizens living on or near Amsterdam avenue for a reopening and rehearing of the petition of the Forty-second street, Manhattanville & St. Nicholas Avenue Railway for permission to change its motive power from horses to electricity. On March 18 the Metropolitan Street Railway, which also operates on Amsterdam avenue, was given permission to change its motive power from horses to the electrical underground conduit system, and on Aug. 18 a like permission was given to the first named company without any objection being made in the public hearings on the matter. Now it is said that the Commissioner of Public Works avers that the construction of the conduits and tracks necessary for the four tracks, which are parallel and close together, will offer serious obstacles to the alteration, renewing or replacement of the six large 50-in- water mains which underlie the surface, and that he believes it will cause great danger to the city's water supply.

Pittsburgh, Pa.—The Consolidated Taaction Co. has obtained permits for four brick and steel buildings contracts for which have been given to Booth & Flinn, at a total cost of $182,663.

Pottsville, Pa.—On Oct. 11 the Pottsville & Reading Electric Railroad running between Pottsville and Shuylkill Haven was opened for business.

At a regular meeting of the board of Board of Directors the resignation of President R. H. Koch was received, but will not be acted upon until the next meeting of the Board in November. It is likely that Mr. F. H. Treat will succeed Mr. Koch.

Victoria, B. C.—The British Columbia Electric Railway Co. has closed a contract with the Esquimault Water-Works Co. under which a power-house, with water wheels and generators, will be erected at Goldstream. The power will be transmitted a distance of 12 miles.

TRAFFIC.

Traffic Notes.

The Manufacturers' Club at Detroit has voted to establish a freight bureau.

The Detroit, Grand Rapids & Western is to establish a car ferry between Muskegon and Milwaukee, to begin running by Dec. 1. The ferry boat Shenango No. 2 has been leased.

The Seaboard Air Line announces, beginning Oct. 25, a reduction of 33⅓ per cent. in passenger rates from Portsmouth to Atlanta and beyond. This evidences an intention to renew the fight of last year.

Arrangements have finally been perfected for a line of steamships from Port Arthur, Tex., to Mexican Gulf ports, to be operated by the Kansas City, Pittsburgh & Gulf Railroad and Atlantic & Mexican Steamship Company.

The Norfolk & Western has made a reduction of about 20 per cent. in the rates from the Atlantic seaboard to southwestern cities on dry goods, boots and shoes, canned goods, C. L., bagging, C. L., and certain other commodities.

The managers of the Joint Traffic Association have recommended the raising of emigrant passenger fares on Jan. 1 to the basis of New York to Chicago, $15; Boston to Chicago, $14; Canadian ports and Portland to Chicago, $13.50; Philadelphia to Chicago, $13.75, and Baltimore to Chicago, $13.45.

It appears that the suits of the Attorney-General of Texas against various railroads, for violating the state rules concerning freight rates and classification last year, were compromised, on the understanding that the roads should plead guilty in a certain number of cases; and the Austin & Northwestern has just paid $500 penalty in one suit. It is said that this and other companies under Southern Pacific control pleaded guilty, under the compromise agreement, in 50 suits, and paid to the state $25,000.

Increased Lumber Traffic in July and August.

The total domestic lumber business in the United States for the first six months of 1897, as compared with the corresponding periods of the two years preceding, shows a decrease of 11.28 per cent. as compared with 1895, and an increase of 5.93 per cent. as compared with 1896. July and August, 1897, show a decrease as compared with 1895 of 3.83 per cent., and an increase of 18.23 per cent. as compared with 1896. These figures are based on the actual number of cars of lumber handled by 53 of the leading lumber-carrying railroads and hence will hold good for the entire country.—*The Timberman.*

Chicago Traffic Matters.

CHICAGO, Oct. 20, 1897.

The Lake Shore & Michigan Southern has asked the managers of the Joint Traffic Association for an adjustment of the differential fares between Chicago and New York, and requested that the board hear arguments on the matter on or prior to Oct. 31. In his application for differentials over the roads east of Buffalo, General Passenger Agent Smith says; "If it is proper that differential fares should be conceded to a route for which a standard line is used from Pittsburgh to New York, we believe our plea for the same concession over the differential lines east of Buffalo to be entirely consistent." The Michigan Central will make a similar request for differential fares.

Traffic officers of all the Mexican railroads and of various steamship companies met in this city last week to discuss differentials between the all-rail and the rail and water lines. It was decided to settle the matter by arbitration, decision to be rendered by Jan. 1.

The sub-committee of the Central Passenger Association has recommended that a rate of one-half the regular limited fare be made to lake sailors to their home port on the close of navigation.

Excessive commissions are said to be again disturbing passenger business between Chicago and the Missouri River and St. Paul.

No advance was made in flour and grain rates from the Northwest on the 15th as had been agreed, it being feared that the advance would stop the few shipments being made, business being extremely light.

Yesterday the Sunset Limited made its initial run from Chicago to San Francisco, and if the season of 1897-98 proves successful this train will hereafter be maintained from this gateway.

The Southern Pacific and Canadian Pacific roads have joined the Western roads in the agreement to handle westbound immigrant business direct with the steamship companies, thereby dispensing with the services of the emigrant agents at New York.

The Western Freight Traffic officers have decided to confer every Tuesday for the purpose of supporting efforts to properly and legally maintain rates.

Eastbound shipments from Chicago and Chicago junctions to points at and beyond the Western termini of the trunk lines for the week ending Oct. 14 amounted to 60,107 tons, as compared with 57,095 tons the preceding week. This statement includes 24,139 tons of grain, 2,133 tons of flour and 10,424 tons of provisions, but not live stock. The following is the statement in detail for the two weeks:

Roads.	WEEK ENDING OCT. 14.		WEEK ENDING OCT. 7.	
	Tons.	p. c.	Tons.	p. c.
Baltimore & Ohio	4,307	7 2	4,395	7.7
C., C., C. & St. Louis	3,348	5 6	2,949	5 2
Erie	7,842	13.1	8,475	15.2
Grand Trunk	6,987	11.6	6,414	11 2
L. S. & M. S.	6,690	11.1	5 699	10.0
Michigan Central	8,060	13.4	6,283	11.0
N. Y., Chi. & St. L.	5,094	8.5	4,812	8.4
Pitts., Cin., Chi. & St. Louis.	4,527	7.5	5,170	9.1
Pitts., Ft. Wayne & Chicago	7,478	12 4	7,901	13.8
Wabash	5,774	9.6	4,797	8.4
Totals	60,107	100.0	57,095	100.0

Lake shipments last week were 151,600 tons.